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AUTHOR Toms-Bronowski, Susan
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ABSTRACT

A study compared the instructional strategies of semantic mapping and semantic feature analysis with a traditional contextual approach for vocabulary acquisition. Subjects, 36 fourth, fifth, and six grade classes, were taught a set of 15 target words in each of the three instructional conditions for each of 3 weeks. Classes were assessed at the end of each week with three tests designed to measure word knowledge in a manner reflecting each teaching strategy. All classes were also tested on all 45 target words at the end of the fourth week of the study with a comprehensive test that required recognition of a direct general definition. Results indicated that both semantic feature analysis and semantic mapping were more effective than context for general vocabulary acquisition, with semantic feature analysis groups performing at higher percentage levels on more target words than did either of the other groups on the comprehensive test. Context treatment groups significantly outperformed the other treatment groups on the test that reflected their treatment. These results indicated that the two strategies that rely on categorization of concepts as influenced by students' prior knowledge bases do positively affect vocabulary acquisition. The type of test format utilized to assess word knowledge also influences student performance. (Author/JL)

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Program Report 83-3

AN INVESTIGATION OF THE EFFECTIVENESS OF SEMANTIC MAPPING AND SEMANTIC FEATURE ANALYSIS WITH INTERMEDIATE GRADE LEVEL CHILDREN

by

Susan Toms-Bronowski

Report from the Program on
Student Diversity and Classroom Processes:
Skill Development--Language Arts

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- diversity as a fundamental question in American social thought, through studies of social policy related to education

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Abstract

Susan C. Toms-Bronowski

Under the supervision of Professor Dale D. Johnson

Investigators examining the effectiveness of vocabulary teaching techniques (dictionary usage, structural analysis, context, mnemonic devices) have shown that the specific teaching of vocabulary is desirable and indeed improves general word knowledge. Two vocabulary teaching strategies (semantic mapping and semantic feature analysis) that capitalize on learners' prior knowledge bases through the categorical arrangement of concepts have infrequently been directly investigated for general vocabulary acquisition. The present study compared the instructional strategies of semantic mapping and semantic feature analysis with a traditional contextual approach for vocabulary acquisition. The two research questions of interest were:

1) Are the two instructional strategies, Semantic Mapping and Semantic Feature Analysis as effective as the traditional approach of Contextual Analysis for vocabulary building?

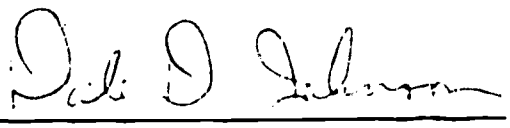
2) Does the success of a particular teaching strategy depend on the performance measure taken?

Thirty-six intermediate grade-level classes (4, 5, 6) from two midwestern, suburban communities were taught a set of 15 target words in each of the three instructional conditions for each of three weeks. Classes were assessed at the end of each week with three tests designed to measure word knowledge in a manner reflecting each teaching strategy. All classes were also tested (on all 45 target words) at the end of the fourth week of the study with a comprehensive test that required recognition of a direct general definition.

Results of the study indicated that both Semantic Feature Analysis and Semantic Mapping were more effective than Context for general vocabulary acquisition. A repeated measures analysis of variance on the comprehensive dependent measure data indicated a treatment effect ($F = 18.94$, $p < .001$) where the Semantic Feature Analysis condition significantly outperformed the Semantic Mapping condition, and the Context condition respectively. Comparable analyses of weekly dependent measures data indicated that the Context treatment groups significantly outperformed the other treatment groups on the test that reflected their treatment.

The major conclusion of the study is that the two strategies which rely on categorization of concepts as influenced by students'

prior knowledge bases do positively affect vocabulary acquisition. The type of test format utilized to assess word knowledge also influences student performance.



Professor Dale D. Johnson

CHAPTER ONE

INTRODUCTION TO THE STUDY

Vocabulary knowledge as an important component in reading comprehension is well documented (Davis, 1942, 1944; Hunt, 1957; Spearitt, 1972). It is also well established that the specific teaching of vocabulary is desirable and indeed improves general word knowledge and reading comprehension (Petty, Herold, Stoll, 1968; Manzo & Sherk, 1971-72; Long, Hein, & Coggiola, 1978). Several vocabulary teaching strategies (i.e., dictionary usage, context, mnemonic devices) have been empirically validated as effective for general vocabulary acquisition and development. Two vocabulary teaching strategies (semantic mapping, semantic feature analysis) that capitalize on learner's prior knowledge bases have not been directly investigated. Instructional strategies using semantic mapping and semantic feature analysis are increasingly in use in classrooms, although their effectiveness has not been empirically validated. However, based on the fact that teachers who have used semantic mapping and semantic feature analysis have found them to be helpful, several recent reading methods texts suggest the inclusion of these strategies in teacher's repertoires for vocabulary building (Johnson & Pearson, 1978; Pearson & Johnson, 1978; Smith & Barrett, 1979; Smith & Johnson, 1980).

Purpose of the Study

The purpose of the study was to compare the practicality and effectiveness of three specific vocabulary teaching strategies: two alternative prior knowledge methods (semantic mapping and semantic feature analysis), with a conventional method (contextual analysis) on general vocabulary development.

The two major questions being asked were: (1) Which of the three teaching strategies is most effective? and (2) Does the success of a particular teaching strategy depend on the performance measure taken? While it was expected that dependent measure performance would relate closely to analagous instructional strategy, there is as yet no theoretical basis for hypotheses about the effectiveness of the teaching strategies.

Rationale for the Study

Historically, research on word knowledge and vocabulary acquisition has focused primarily on two main areas: (1) a demonstration that word knowledge per se is an important component in reading comprehension, and (2) an identification of the discrete skills involved in vocabulary acquisition. In the last ten to fifteen years, however, researchers have also begun to examine the efficacy of specific teaching strategies for the development of vocabulary knowledge.

Predominant theories of learning have always had an influence on investigators' views of the reading process and consequently have affected the way in which vocabulary learning has been studied.

New psychological and pedagogical models of learning which are derived from an information processing paradigm are having a great impact on current research on vocabulary learning.

Word Knowledge in Relation to Reading Comprehension

Word knowledge has always been identified as a significant component in comprehension. Early researchers in reading comprehension and in verbal intelligence found that vocabulary knowledge played a significant role in both areas. For example, Pressey and Pressey (1921) concluded that silent reading performance improved with a large vocabulary. Hilliard (1924) stated that a child's vocabulary level was second only to general intelligence when several measures were correlated with reading comprehension. In 1925, Irion reported that word knowledge was a significant variable for reading comprehension; though Irion's study dealt with correlations of literal and inferential test scores with total passage comprehension of a wide variety of reading materials, there was the implication that word knowledge was important for passage comprehension. In a study by Albright (1927), in which she classified students' errors in answering questions assessing passage comprehension, knowledge of word meanings was once again an important determinant in comprehension.

The early factor analytic studies of reading comprehension were attempts to identify specific skills or skill areas important for comprehension. Davis (1942, 1944) was one of the first to examine the component skills involved in reading comprehension. In

his landmark study, Davis (1942) factor analyzed nine reading comprehension subskills and identified two primary reading skill components (1) Word Knowledge or Vocabulary and (2) Reasoning in Reading.

In 1939 Davis had participated in the development of a diagnostic test, the Cooperative Reading Comprehension Tests. The intent of the test was "to provide reliable measures of the most important independent mental abilities and specific skills that are required in understanding the kinds of materials that students commonly have to read" (underscoring added; Davis, 1942, p. 365). Davis, therefore, conducted a survey of the literature in the field of reading to determine which reading skills, as reported by authorities in the field, were considered to be the most important elements in reading comprehension.

From a compilation of several hundred skills nine clusters of testable skills were selected to form the basis of Form Q of the Cooperative Reading Comprehension Tests. (Refer to Column 1 Table 1.) Multiple-choice test items, with five responses for each item, were constructed for each of the skill areas in such a way that each item in Form Q tested only one skill area. The number of items for each skill was based "on the judgments of authorities in the field of reading concerning the importance of each skill in reading comprehension" (p. 368). Thus, for example, Skill 1: Knowledge of Word Meanings, represented what was considered by authorities in reading as the most important skill and, therefore,

Table 1

Nine Skills in Reading Comprehension

Skill	Number of items	Mean	Variance
1. Recalling word meanings	60	23.77	134.70
2. Drawing inferences about the meaning of a word from content	20	12.70	10.56
3. Following the structure of a passage	9	4.20	3.01
4. Formulating the main thought of a passage	5	2.97	1.22
5. Finding answers to questions answered explicitly or merely in paraphrase in the content	22	18.10	6.05
6. Weaving together ideas in the content	42	25.67	32.17
7. Drawing inferences from the content	43	28.46	33.75
8. Identifying a writer's techniques, literary devices, tone, and mood	10	6.75	3.46
9. Recognizing a writer's purpose, intent, and point of view	27	15.19	16.54

Note. From "Research in Comprehension in Reading" by F. B. Davis, Reading Research Quarterly, 1968, 3(4), p. 504.

it had the most test items (60). (Refer to Column 2 of Skill 1 in Table 1.)

After the Cooperative Reading Comprehension Test had been published by the Test Service of the American Council on Education, Davis administered Form Q of the test to 421 college freshmen enrolled at teachers colleges in Connecticut and Massachusetts. The first step in the data analysis was to determine the intercorrelations of the scores in the nine skill areas. As the diagnostic test was designed to represent independent abilities, it was anticipated that there would be low correlations among the skills. Contrary to the anticipated results, the intercorrelations of the items show a fair amount of relationship to one another. Subsequently, the data were factor analyzed using Kelly's (1935) principal axes method. "The nine principal components that were obtained were remarkably clear-cut and lent themselves to ready interpretation," according to Davis (1942, p. 368). Davis noted that two components accounted for 89 percent of the variance. He interpreted these components as: (1) Word Knowledge and (2) Reasoning in Reading. An examination of the data shows that component 1, Word Knowledge, is primarily attributable to Skill 1, Knowledge of Word Meanings. On the other hand, it appears that component 2, Reasoning in Reading, is made up of two reading skills, Skills 6 and 7.

In later studies, Davis (1968, 1972) continued to demonstrate a "components view" of comprehension with knowledge of word meanings and reasoning in reading as the two primary components. Other

researchers who reanalyzed Davis' work, while often not in agreement with Davis' findings, continued to defend the components view of comprehension (Blackowicz, in press; Hunt, 1957; Johnson, Toms-Bronowski, & Buss, in press; Spearitt, 1972) with only a few exceptions (Thorndike, 1971; Thurstone, 1946).

Though there is agreement among many researchers that word knowledge is an important component of comprehension, there have been few research studies designed to examine the effectiveness of training in vocabulary development, either independently or in relation to the entire comprehension process (Davis, 1972). This is probably due, in part, to the fact that the question of why word knowledge is so important is still unsettled. There are at least three hypotheses that attempt to explain the high correlation between vocabulary knowledge and linguistic competency (Anderson & Freebody, 1979).

The first, an instrumentalist hypothesis, claims that knowing words enables text comprehension (causal chain). Where vocabulary comes from is not of prime concern, however, once possessed word knowledge helps the reader understand text. The second position, the aptitude hypothesis, suggests that some persons are better able to comprehend text because of superior verbal ability, that is, those children with greatest verbal fluency tend to comprehend best. The third position, the knowledge hypothesis, examines the relationship of stored word knowledge to the comprehension of discourse. Word knowledge is viewed within the context of what a per-

son knows and brings to the task when comprehending text; word knowledge, per se, reflects knowledge in general. The premise basic to this position is that prior knowledge is crucial for understanding text. It is not just the individual word meanings that are important, but the entire conceptual framework elicited by word meaning. It is this general knowledge which interacts with text to produce comprehension.

These positions are not inexorably separate, but it is important to distinguish the knowledge hypothesis from the other two. The instrumentalist and aptitude hypotheses stress individual word meanings and verbal ability, respectively, whereas the knowledge hypothesis emphasizes conceptual frameworks.

The first two hypotheses, the instrumentalist and the aptitude hypotheses, have historically been investigated within a behavioristic paradigm for psychological theories of learning and have tended to focus on delimiting what the word knowledge skills are. The educational implications of these two hypotheses are that instruction in strategies which are designed to increase vocabularies or which emphasize drill on reading fundamentals (e.g., word identification, practice of literal recall) will also increase text comprehension. The third hypothesis, the knowledge hypothesis, is rooted in an information processing paradigm and has historically--or perhaps more aptly, ahistorically--grown out of behavioristic notions. Rather than investigating the skills involved in word acquisition and word knowledge, investigators in this third

area of research are concerned with how these identified skills are acquired and applied. The educational implications of the knowledge hypothesis are that instruction which taps the prior knowledge base, i.e., which consciously delineates the categorical relationships inherent in word knowledge, will improve text comprehension.

Psychological Foundations for Knowledge Hypothesis

The notion of formulating categorical relationships as a fundamental mental process is not new. In fact it is probably one of the few mental operations that most psychologists and educators would actually agree does take place in the minds of thinkers and readers.

For example, when a person hears or reads the word dog, a dictionary definition of the word does not necessarily flash in front of a person's mind's eye. To perceive, understand, or remember what a dog is, a person must, in one form or another, call up some or all associations that word has for the actual or metaphorical object (see Figure 1). Through these associations, also termed a schema (Bartlett, 1932; Rumelhart, 1975) and a frame (van Dijk, 1977), the concept of dog is instantiated. The elicited definition reflects the person's personal predilictions and prior experiences (real or vicarious) with the object, in conjunction with the demanded constraints of the particular context.

Vocabulary knowledge or word concept knowledge is viewed, then,

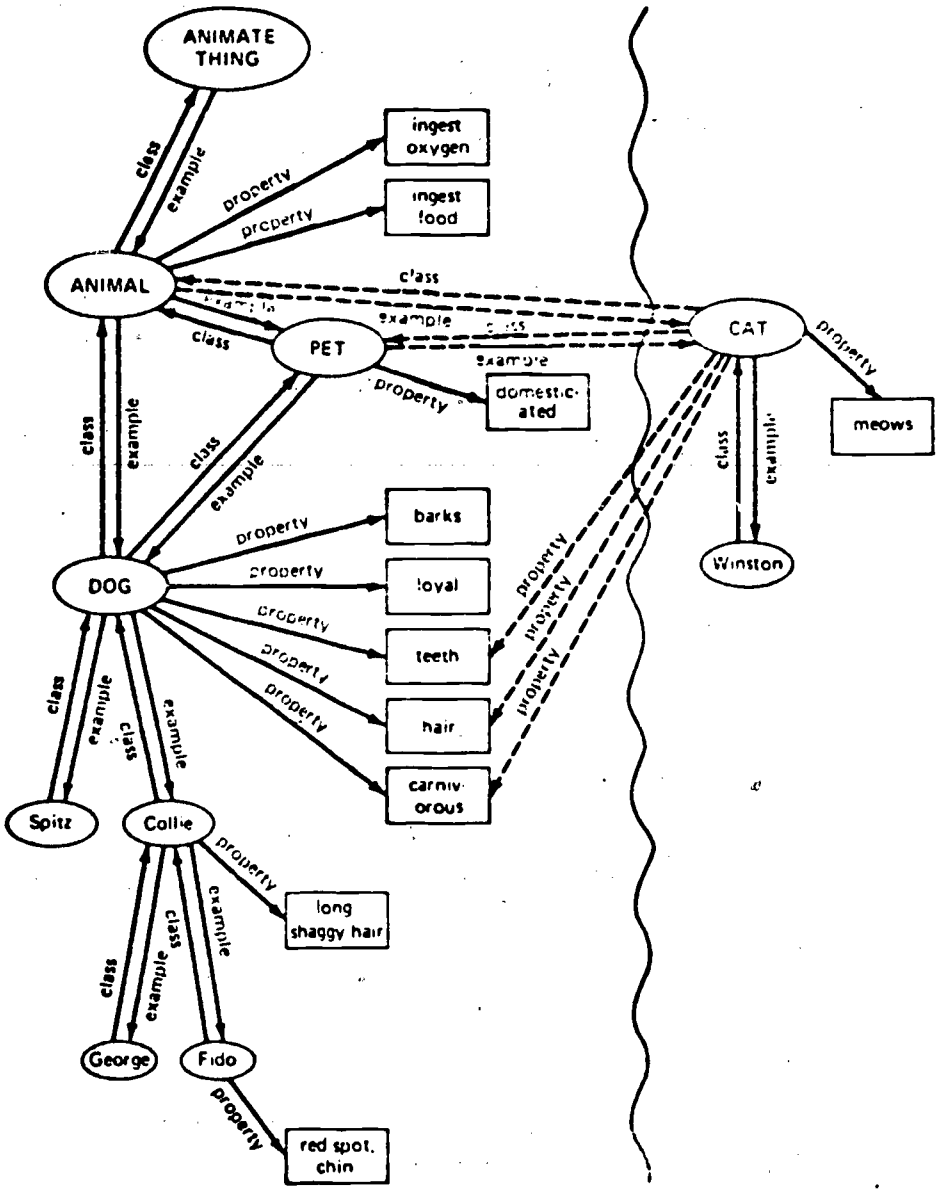


Figure 1. Incomplete semantic map of "dog."*

*Johnson, D. D., & Pearson, P. D. Teaching Reading Vocabulary. New York: Holt, Rinehart and Winston, 1978, p. 36.

as an integration of the many possible associated links or networks for any word with the situational constraints that together construct a word's meaning. Instruction in new vocabulary words, whether as part of a discrete vocabulary lesson or in conjunction with reading texts, must activate the categorization of relationships inherent in word knowledge.

Investigators who first looked at how words are learned, stored, and retrieved from memory, rather than how important word knowledge is, found intriguing learning characteristics related to vocabulary acquisition. In one list-learning study (Bousfield, 1953), a phenomenon termed clustering was found. Subjects who were given a list of randomly arranged items recalled the items in a cluster or "a sequence of associates having an essential relationship between its members" (p. 229). Sequences of related items were: hawk, eagle, vulture, and chicken, turkey, duck, goose. The first three words could be classified as birds of prey, and the others as domestic fowl.

Though clustering was explained in the behavioral terms of habit strength and relatedness increments, results indicated a sequencing of associates and led to further investigation of the clustering phenomenon. This categorization practice was found to be more effective during cued recall conditions (category names given for recall task) than non-cued conditions (no category name given to aid recall). Subjects' accessibility to words in memory was

aided by explicit cues, those that tapped clustering (Tulving & Pearlston, 1966).

Another group of studies indicated that "chunking" of several clusters of words improved subjective cluster recall (Bower, Lesgold, & Tieman, 1969). Subjects reduced the number of units to be retrieved by grouping or subdividing the material to be learned into subjective clusters, either through using mental imagery or through associating two or more groups of words together to form larger units or chunks of information.

An extended application of the phenomenon of clustering or chunking was identified in a study by Perfetti and Goodman (1970). In their study, subjects were assigned to one of three treatment groups. Subjects in the first treatment group had the target words read aloud to them in a standard list-learning procedure. The subjects in the second and third treatment groups heard each target word within the context of a sentence. For the subjects in the second treatment group, the target word had a high frequency association with the meaning inherent in the sentence, (e.g., organ-music), whereas for the subjects in the third treatment group, the meaning of the target word in the sentence was of low frequency (e.g., organ-body). A sentence for Treatment 2 was "The developing country is ready to take any steps necessary to ensure its independence," and the corresponding sentence for Treatment 3 was "Many families rent a house in the country for the summer months. For the word country, nation is the high frequency correlate and city,

the low frequency correlate. All subjects were then given a recognition task; for each of 56 words, subjects were to indicate whether or not they had been presented with the word during the treatment. The list of 56 words included the 14 target words (E words), 14 high-associate words (H words), 14 low-associate words (L words), and 14 non-related words (N words).

Of primary interest in the recognition task given was the number of false-positive responses (refer to Table 2). Perfetti and Goodman concluded that false-positive responses were induced by sentences as well as by words and in fact were possibly enhanced by sentences. For example, note the 47 percent of false-positive responses for L words by Treatment 3 in Table 2. They further concluded that it was "likely that the semantic richness of sentences leads to the activation of a larger set of semantic properties, and this is reflected by responses to H words and L words, but not N words, the last having failed to make semantic contact with the activated features" (p. 423). Thus the clustering that occurs when lists of words are of prime interest are subsumed by an "activation of a larger set of semantic properties" when processing connected discourse (p. 423).

These types of research findings led some investigators to look beyond behavioristic learning models to develop information processing models that would represent what seemed to be happening inside subjects' heads when the subjects were processing words and

Table 2

Percent of Positive Responses to Four Word Types Under Three Conditions

Condition	Word Type[a]			
	E word	L word	H word	N word
Treatment 1	66	25	28	23
Treatment 2	44	25	39	16
Treatment 3	68	47	33	25

Note. From "Semantic constraint on the decoding of ambiguous words" by C. A. Perfetti and D. Goodman, Journal of Experimental Psychology, 1970, 86(3), p. 422.

[a]E word (target word)

L word (low frequency association with target word)

H word (high frequency association with target word)

N word (nonrelated to target word)

longer discourse.

The work of Collins and Quillian (1969, 1970) generated several hypotheses about information processing, two of which are represented by the Subway Map Model and the Spreading Activation Model (1970). According to the Subway Map Model, if a subject were asked to respond in a yes-no fashion to the veracity of the statement "Canaries are yellow', "semantic memory lights" (1970, p. 312) would light a path of least resistance through the subject's hierarchical memory structure called animals until enough word-concepts (nodes) were connected that an inference could be made about truth of the original statement. The Spreading Activation Model adds a facilitating effect in that, rather than only a single path of nodes being lit, closely surrounding categorical nodes would also be activated (see Figure 2). This model indicates that processing a second sentence about canaries (e.g., A canary can sing) would be faster than processing an unrelated sentence (e.g., The weather is cloudy). A 1975 article by Collins and Loftus reinforced the belief that something like spreading activation does take place when people process words, sentences, and prose.

Influence of Text Representation Comprehension Models on Vocabulary Research

The role of the reading researcher has been characterized as the building of comprehension models based within the constraints of memory models and information-processing models. The task of

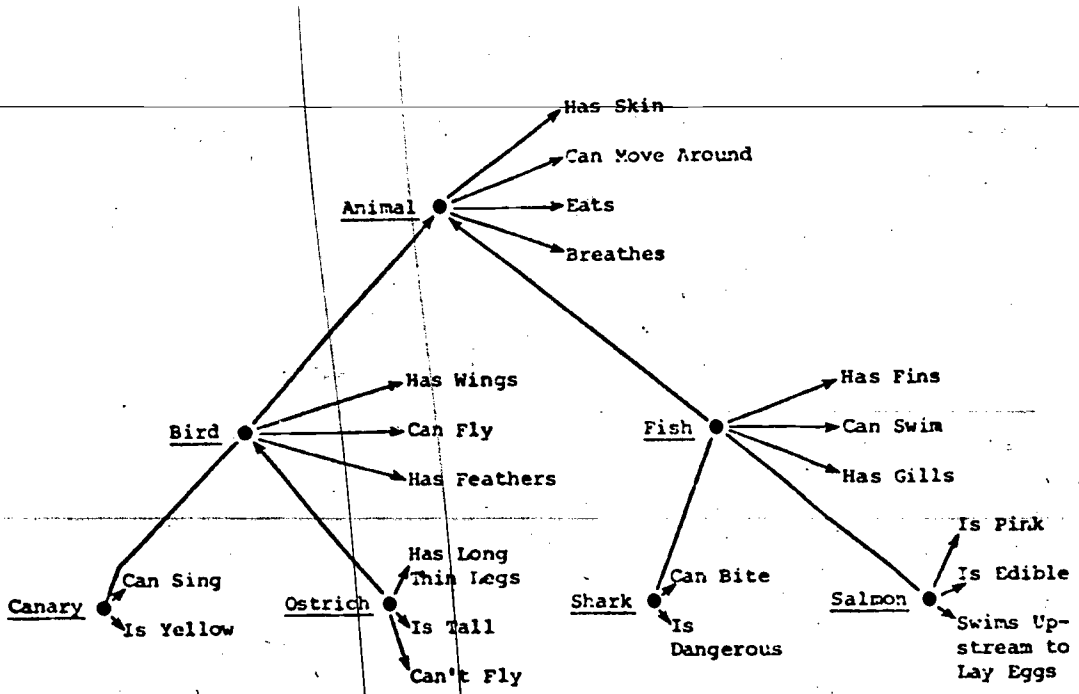


Figure 2. Spreading Activation Model: Illustration of the hypothetical memory structure for a three-level hierarchy.

Note. From "Retrieval time from semantic memory" by A. M. Collins and M. P. Quillian, Journal of Verbal Learning and Verbal Behavior, 1969, 8, 240-247.

building comprehension models involves going beyond the printed page and beyond the reader's responses to comprehension probes, to go into "the reader's head" in order to delineate the process of comprehension. To know how one knows is to begin to understand knowledge, the possessor of knowledge, and language--the mediator.

In the 1970's hierarchical and flexible memory models (Quillian's Teachable Language Comprehender, 1968; Collins and Loftus' Spreading Activation Model, 1975; Smith, Shoben, and Rips' Feature Comparison Model, 1974) began to supplement the linear, unidimensional memory models that had dominated the field until then. These more flexible models acknowledge Craik and Lockhart's (1972) levels of processing view of memory and Tulving's (1972) encoding specificity phenomenon, within a framework that necessitated the ability of readers to infer. With semantic memory, as compared to episodic memory, the role of inferring is inherent.

When verbal learning research moved from serial, rote memorization of word lists to list learning of sentences and then to connected discourse, it became obvious that more was going on than simply the addition of chunked inputs into short-term memory buffers. The field of discourse analysis emerged as research began to focus on understanding the processes language users exhibit to construct coherent and contextually appropriate meanings from communication.

The use of computers, an invaluable aid in much memory/comprehension research, required a coherent description of language, lan-

guage processing constraints, and memory searching patterns. What was needed was a representation of meaning and an explanation of the type of comprehension processing that was apparently proceeding through a hierarchical structure in a forward and backward inference pattern. In Schank and Abelson's (1975) initial work with computers, they first emphasized the semantic decomposition of prose in an attempt to define a set of semantic primitives (meanings of words) through which the meaning of a text could be defined. This was a prerequisite for developing the processing systems which would later attempt to reconstruct the textual representation of meaning.

Processing of any type of communication is determined by the text itself and the overall knowledge of the comprehender. Recall is one type of observable evidence that comprehension has taken place. Recall protocols of reader's comprehension of prose passages display semantic chunking, omissions of redundancies, assimilation of meaningful propositions into new sentence combinations and sequences, and the intrusion of idiosyncratic novelties. Comprehension, then, involves the reader in a problem-solving situation where integration of text and extra-textual knowledge merges based on rules of inferences from both. How to determine the processes and inferences involved has been the province of research in the area.

Kintsch (1977) labels the basic units of meaning propositions.

Propositions are groups of word concepts, one of which serves as predicator, and the others as arguments. The ordered and connected propositions represent the meaning of a text and are called text bases. The amount and depth of inferring are determined by controlling the number of propositions, the number of word concepts, and the number of embedded propositions while measuring reading time, reaction time, and recall time.

Kintsch, Kozminsky, Streby, McKoon, and Keenan (1975) in a series of studies attempted to identify some content variables that significantly affected comprehension and memory for prose. They found evidence that supported the following premises:

--The number of propositions in the text base is an important determinant of rate of comprehension and amount recalled.

--Text bases that include many different word concepts as arguments of propositions require more processing than text bases with few different word concepts, regardless of the number of propositions.

--Reading time is a function of the number of propositions processed as determined through immediate recall.

--More superordinate propositions are recalled than subordinate ones, regardless of the serial position. Superordinate propositions seem to be forgotten more slowly than subordinates.

Utilizing such information about text bases, researchers began to manipulate variables to determine inference processes, types of inferences, coherence, and staging effects. Perry Thorndyke (1976) developed a view of the role of inferences in comprehension. He states:

> Information from incoming propositions is clustered together in contextual frames with plausible inferences that provide coherence and continuity. What is stored in memory then, is a structure encoding the situation described by a series of related propositions and their requisite inferences. Within such an organizing frame the inferences become indistinguishable from explicitly-stated information. (p. 440)

Paris (1975) adds to this view the role of constructive elaboration and integration. Readers expand explicit information through inferential operations and integrate these constructed relationships with the explicit base. The inferences provide an assimilative and accomodative function to achieve efficiency and parsimony of storage.

A later model of comprehension by Kintsch and Teun A. van Dijk (1978) includes an inference processing component. This text-based model incorporates the inference processes within its macro-rules. Based on the earlier propositional network theory, Kintsch and van Dijk described the reading process/comprehension process in a bottom-up, text-based manner. Within the framework of the model, top-down processes are also possible. The model is based on the assumption that comprehension of a text comes from a response the reader creates, not something given in the text itself. The possible types of inferences are: inferring a missing link between propositions in order to make the text base coherent, inferring presuppositions, and inferring conversationally implied meaning (Kintsch, 1978, p. 77).

According to Kintsch and van Dijk, readers create responses

by applying the macro-rules of generalization, deletion, integration, and construction to the super-structure (text). Generalization occurs when specific details are tied to a general topic to ensure memory. Propositions would be deleted if they did not tie into any general macro-structure or theme. Integration and construction occurs when information that is already a generalization is organized and compacted. This is done by integrating or deleting micro-information or details because they are already part of the macro-proposition or world knowledge. By constructing sequences, readers replace propositions by a macro-proposition that incorporates all the details. Using the construction macro-rule allows for the extraction of details at a later point during retrieval since they are inherent in the macro-proposition.

By applying the model, Kintsch and van Dijk can determine experimentally the capacity of the short-term memory buffer, maximum input per cycle, and the reproduction probability for different selection strategies. This can be achieved by analyzing which text propositions are recalled.

The progression from memory-processing models to text representation models is certainly understandable. If people process information from text in a particular fashion, then it could be assumed that text might contain similar inherent structures. The educational implications would then be to teach the underlying structure, the processing strategies, or the cueing systems that

allow for greater ease and competency in reading comprehension.

Recently, investigators of prose comprehension have attempted to include in their studies an acknowledgment of the structure inherent in text with the perspective implicit in the information-processing paradigm. This has enabled researchers (Armbruster & Anderson, 1980: Dansereau, Collins, McDonald, Holley, Garland, Diekhoff, & Evans, 1979; Holley, Dansereau, McDonald, Garland, & Collins, 1979; Long, Hein, & Coggiola, 1978) to determine more explicitly the comprehension processes as well as possible teaching strategies that tap the mental processes involved.

Long, Hein, and Coggiola (1978), for example, attempted to determine if networking strategies used by readers to aid in comprehension did indeed help in processing prose. In their study, subjects were taught strategies that would help them "network" prose selections (see Figure 3). Although the intent of the study was to determine processes involved in the comprehension of prose selections, the importance of word knowledge was not overlooked. The networking strategies themselves emphasized:

1. Deciding importance of concepts
2. Reorganizing and re-representing material
3. Understanding relationships between concepts.

Implicit in these strategies is the importance of concepts (words, phrases, sentences, paragraphs). What must once again be addressed, then, is the importance of word knowledge and its rela-

Text: The Chevy Roadster, Model A Ford, and Model T Ford are different kinds of antique cars. The Chevy Roadster is more of a sports car than the Model A and Model T Fords. The Chevy Roadster has wood spoke wheels, leather seats, bullet headlights and a cutout. A cutout is a loud whistle placed in the exhause pipe of antique cars which can be turned off and on from the dash. Turning on the cutoff results in a loud whistle which aggravates parents and policemen.

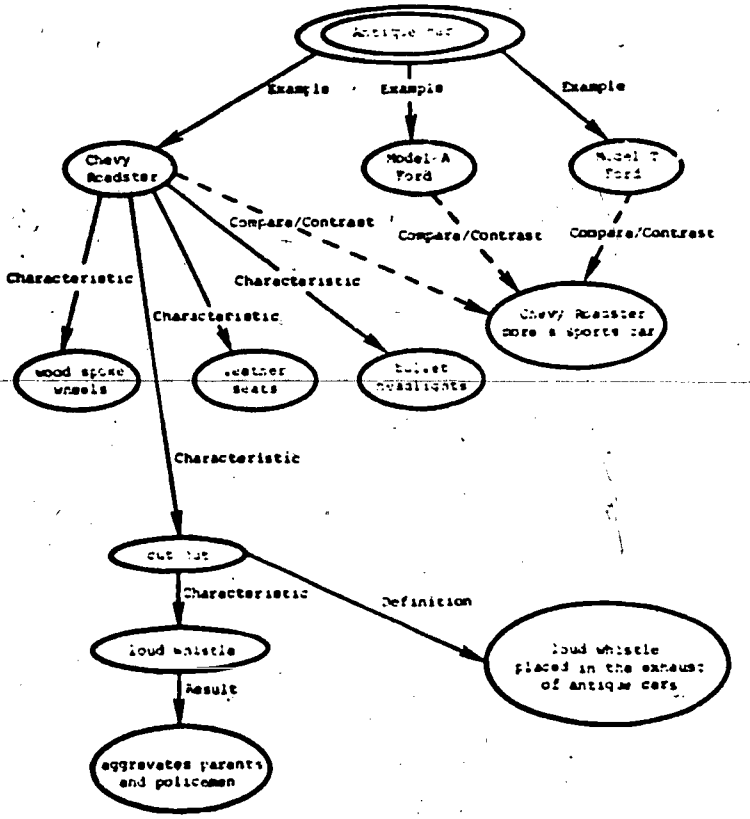


Figure 3. An example of a network.

Note. From Long, G., Hein, R., & Coggiola, D., Networking: A semantic-based learning strategy for improving prose comprehension. Paper presented at the annual meeting of the American Educational Research Association, Toronto, Canada, 1978, p. 5.

tionship within the comprehension process. A graphic representation of this importance is illustrated in Long, Hein, and Coggiola's model for prose comprehension from a networking perspective (see Figure 4).

Practical Significance of Vocabulary Research/Teaching Strategies

The memory models, information-processing models, text representation models, and comprehension studies discussed in the previous sections have had a notable effect on current vocabulary research.

Information based on both the list-learning and information processing studies lend support to the general knowledge hypothesis regarding word acquisition and word knowledge. The following factors in word knowledge have been identified.

a. Readers "cluster" or "chunk" words into categories as a strategy for remembering lists of words (Bousfield, 1953; Bower, Lesgold & Tieman, 1969).

b. Readers utilize semantic relations between and among words as a strategy for disambiguating words in sentences (Perfetti & Goodman, 1970).

c. Word concepts may be arranged in memory in categorical structures that are hierarchical in nature (Collins & Loftus, 1975; Collins & Quillian, 1969, 1970).

d. "Nodes," "links," or "networks," which facilitate the connection of information may be between the word-concept

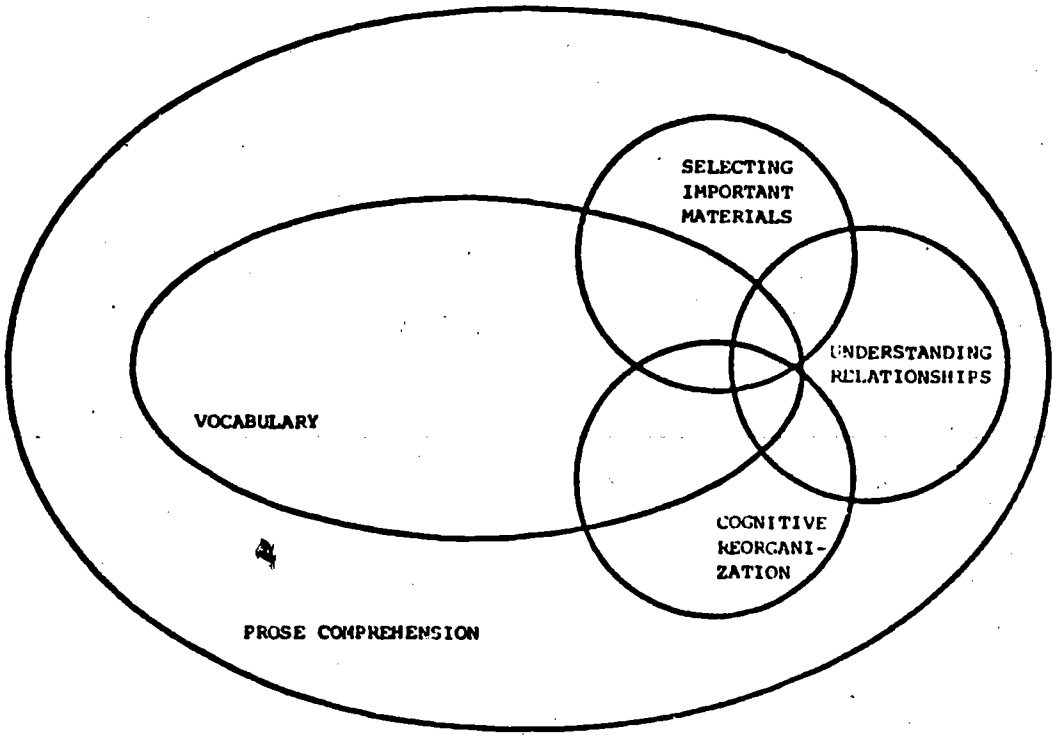


Figure 4. Prose comprehension from a networking perspective.

Note. From Long, G., Hein, R., & Coggiola, D., Networking: A semantic-based learning strategy for improving prose comprehension. Paper presented at the annual meeting of the American Educational Research Association, Toronto, Canada, 1978, p. 3.

structures (Collins & Loftus, 1975; Collins & Quillian, 1969, 1970; Kintsch, 1977, Schank & Abelson, 1975). Cues or strategies either employed directly in teaching vocabulary or elicited by the instructional strategy must, therefore, relate new knowledge to that which is already known. Conceptual frameworks for stored word knowledge become crucial. If a person knows about canaries, it is likely that the person will also be able to respond to a question regarding their color. However, if a person does not know what a canary is, the person cannot be expected to respond in a reasonable fashion about its yellow color. A successful teaching strategy, in accordance with this view, might be to begin with the topic animals or birds and, using prior knowledge, "build bridges" (links, networks) between the known to the new (e.g., Canaries are birds. Canaries have color. Canaries are yellow.).

It appears that there are advantages to using teaching strategies that capitalize on categorically arranged conceptual frameworks to increase general vocabulary (Johnson, Toms-Bronowski, & Pittelman, 1981). Research suggests that this type of strategy would help retrieval of known words or concepts both for words in isolation and for words in the context of prose. Might one then extend the logic to say that these strategies would facilitate new word learning? If readers do categorize and map information in memory, educational implications are that the teaching and learn-

ing of new vocabulary would be facilitated if strategies which capitalize on these features were used.

CHAPTER TWO

REVIEW OF LITERATURE

In surveying the literature on the teaching of vocabulary, Petty, Herold, and Stoll (1968) stated that research has not shown one particular instructional method to be significantly better than any other. They found that any instruction geared toward vocabulary-acquisition resulted in larger vocabularies. The studies they reviewed represented primarily the instrumentalist and aptitude view of the role of vocabulary in comprehension. It must be noted that more recently context (Gipe, 1978-79) and the keyword method (Levin, Pressley, McCormick, Miller, & Shriberg, 1979; Pressley, Levin, & Delaney, 1981), two specific vocabulary teaching techniques, have been shown to be effective teaching strategies.

In a review of literature on vocabulary acquisition, Manzo and Sherk (1971-1972) concluded that any technique which drew attention to word parts or word meanings would positively influence word acquisition. They questioned which techniques would also develop increased word awareness or vocabulary enrichment. Their concluding suggestions emphasized the knowledge approach in that "if we think of word learning as an extension of basic language learning, teaching vocabulary may be a relatively simple matter of exploiting experiences as a means of teaching vocabulary, and exploiting

and using vocabulary as a means of getting the most from experience" (p. 88).

Survey of Current Vocabulary Research/Teaching Strategies

"Exploiting experiences" as a way of teaching vocabulary is not a new idea. A number of writers over the years have stressed the importance of providing children with experiences and relating those experiences to vocabulary concepts (Carroll, 1964; Dale, 1965; Dolch, 1953; O'Rourke, 1974). Instructional methods that relate personal experiences to the acquisition of new vocabulary are recommended extensively in the literature (Harris & Smith, 1976; Herber, 1978; Johnson & Pearson, 1978; Smith & Johnson, 1980; Spache & Spache, 1977).

The acquisition of new word knowledge is based, in part, on the fact that, in metaphor, "comprehension is building bridges between the new and the known": i.e., to be learned, new concepts must be related to concepts already known (Pearson & Johnson, 1978, p. 24). Based on recent information-processing theories (Collins & Quillian, 1969; Lindsay & Norman, 1972: Massaro, 1975), the importance of prior knowledge and the way it is stored and retrieved has prompted a new focus in vocabulary research on determining appropriate vocabulary teaching techniques.

Taylor, Thurlow, and Turnure (1974) reported that elaboration of word meanings, when accompanied by thematic summaries, resulted in improved vocabulary development. Pany and Jenkins (1978) noted

that having students practice reciting word meanings before reading a story was a more effective vocabulary teaching strategy than either having students infer word meanings from the context of the story or telling students the meanings of words as they read the story. However, the investigators did not consider the uneven distribution of instructional time involved in the treatments. The meanings-practiced condition took longer, so the increased exposure to the target words could explain the effectiveness of the strategy. In a subsequent study, Jenkins, Pany, and Schreck (1978) found that the meanings-practiced condition proved most successful on immediate and delayed measures of single word meanings and sentence comprehension. The meanings-practiced treatment did not yield significant results on paragraph comprehension.

While these studies have begun to explore the effectiveness of particular vocabulary teaching strategies for general vocabulary development and for preteaching for textbook selections, they have not considered prior knowledge as a concomitant variable, nor used teaching strategies that tap prior knowledge. Only a few studies have begun to examine either of these concerns (e.g., Ahlfors, 1979; Hagen, 1979).

In the Ahlfors study, 80 sixth-grade students were randomly assigned to one of four groups: Definition Group, Context Group, Experience Group, or Control Group. For each of five weeks the treatment groups were presented 10 targeted vocabulary words. The

Definition Group, modeled after the practice technique reported by Petty, Herold, and Stoll (1968), practiced dictionary definitions through exercises and puzzles. The Context Group had vocabulary words presented within sentences; they were asked to determine meanings of the words from the sentences and then to use the words in their own sentences. The Experience Group created semantic maps for the targeted words. They were then asked to write a definition for the words related to their own experiences. The Control Group read stories and answered comprehension questions with no particular mention of any vocabulary words. All four groups were given stories to read which incorporated the targeted words. All subjects were given a comprehension test, a multiple-choice definition test, an anomalous sentence test, a modified cloze test, and a free-recall test at the end of the weekly treatment. Delayed multiple-choice definition tests and anomalous sentence tests were also administered. Analyses showed that the Definition and Context treatments were superior to the Experience treatment and the Control Group. The Context treatment proved to be a consistently effective technique on all dependent measures with the exception of the multiple-choice definition test, on which the Definition treatment excelled. These findings are consistent with those of Gipe (1977, 1978-79) and also those of Pany and Jenkins (1978) and Jenkins, Pany, and Schreck (1978).

The Hagen study incorporated a control condition and three

prereading vocabulary treatment conditions: semantic mapping, a sight vocabulary approach, and a prereading vocabulary activity modeled after directed reading activities. Each strategy was assessed in terms of passage-specific literal comprehension and vocabulary understanding using post-reading tests. The subject population consisted of fourth and fifth graders who were reading at a third-grade level. The prereading vocabulary activity (PRVA) treatment condition significantly improved both the literal comprehension and the vocabulary understanding of the subjects in the study. The PRVA was the most teacher-directed and text-specific treatment condition. One might hypothesize that the high degree of exposure to and practice with the vocabulary and sentences read in the passage selection may have given poor readers the necessary text-specific information for later retrieval.

Though both of these studies incorporated treatment conditions that relate vocabulary study to subject's experiences or prior knowledge bases, several limitations should be accomodated:

1. Amount of prior knowledge or experience-related manipulations in context conditions should be controlled.
2. Dependent measures designed for the experience conditions should be utilized. The maxim "test what you teach" should be considered.
3. Experience-related strategies, other than semantic mapping should be included in studies.

The consideration of prior knowledge differences of readers does not negate the importance of the traditional vocabulary teaching techniques such as phonic analysis, structural analysis, and use of dictionary and thesaurus. An awareness of the importance of prior knowledge simply switches the emphasis from the instrumentalist and aptitude hypotheses for vocabulary development to the general knowledge hypothesis. The need, then, is to determine the vocabulary teaching strategies which best tap the general knowledge hypothesis.

Vocabulary Teaching Strategies Within a General Knowledge Framework

Several teaching strategies in use today are adaptable to the general knowledge orientation. These include contextual analysis, semantic mapping, and semantic feature analysis. A discussion of each of these strategies is given below.

Contextual Analysis

Contextual analysis, a word identification skill is based on the notion that words are given meaning by the context they are in. With contextual analysis the reader is required to search for semantic, syntactic, or graphic cues surrounding an unknown word as a means of reducing the possibilities of what the word means (Smith & Barrett, 1979, p. 37). A mind set is created whereby students expect to derive meaning for an unknown (or target) word through an understanding of the words or phrases that surround the

unknown word. For example, in the sentence, "My uncle, an itinerant preacher, traveled constantly and was always on the road," the words "traveled" and "on the road" help a reader to discern the meaning of the word "itinerant." Studies using contextual strategies as treatment conditions within the general knowledge orientation have been shown to be helpful in teaching vocabulary (Ahlfors, 1979; Gipe, 1977, 1978-79).

The types of words or phrases that surround the unknown word in a sentence may be categorized into different context clue types. In the many taxonomies delineating context clue types (Ames, 1966; Humes, 1978; Ives, 1979; McCullough, 1959; Thomas & Robinson, 1977), three explicit clue types consistently appear: (1) direct explanation, (2) appositive, and (3) contrast.

A plethora of formats and activities may be generated from these context clue types. For example, in the Gipe (1978-79) study, subjects in the context condition were directed to respond to the target word in context with a word or phrase from their own experience. An example from Gipe's study is as follows:

Direct Explanation or Definition

> The barbarian kicked the dog and hit the owner in the nose. Any person who acts mean to anybody or to anything (is) a barbarian. Barbarian (means) a person who is very mean. Write down something that a barbarian might do at the dinner table. (circles added, p. 630)

Semantic Mapping

Semantic mapping is a categorical structuring of information

in graphic form. It is an individualized content approach, in that students are required to relate new words to their own experiences and prior knowledge (Johnson & Pearson, 1978). A completed semantic map provides the teacher with information about what the students know and reveals anchor points upon which new concepts can be introduced. One completed map for environment is shown in Figure 5.

The general instructional sequence for semantic mapping is:

1. Select a word (topic) of classroom interest or need such as a word central to a story to be read.
2. Write the word on the chalkboard.
3. Ask the class to think of as many words as they can which are in some way related to the word you have written, and jot them on paper, in categories.
4. Have individuals share the words they have written and as they do, write them on the board and attempt to put them into categories.
5. Next, have the students name the categories as shown in Figure 5.

Student discussion is crucial to the success of semantic mapping. The meanings and uses of new words, new meanings for known words, seeing old words in a new light, and seeing the relationships among words are the outcomes of semantic mapping.

When students are expected to learn technical vocabulary or

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Week III, Lesson 3

Name Classroom Copy
Teacher _____ Grade ___

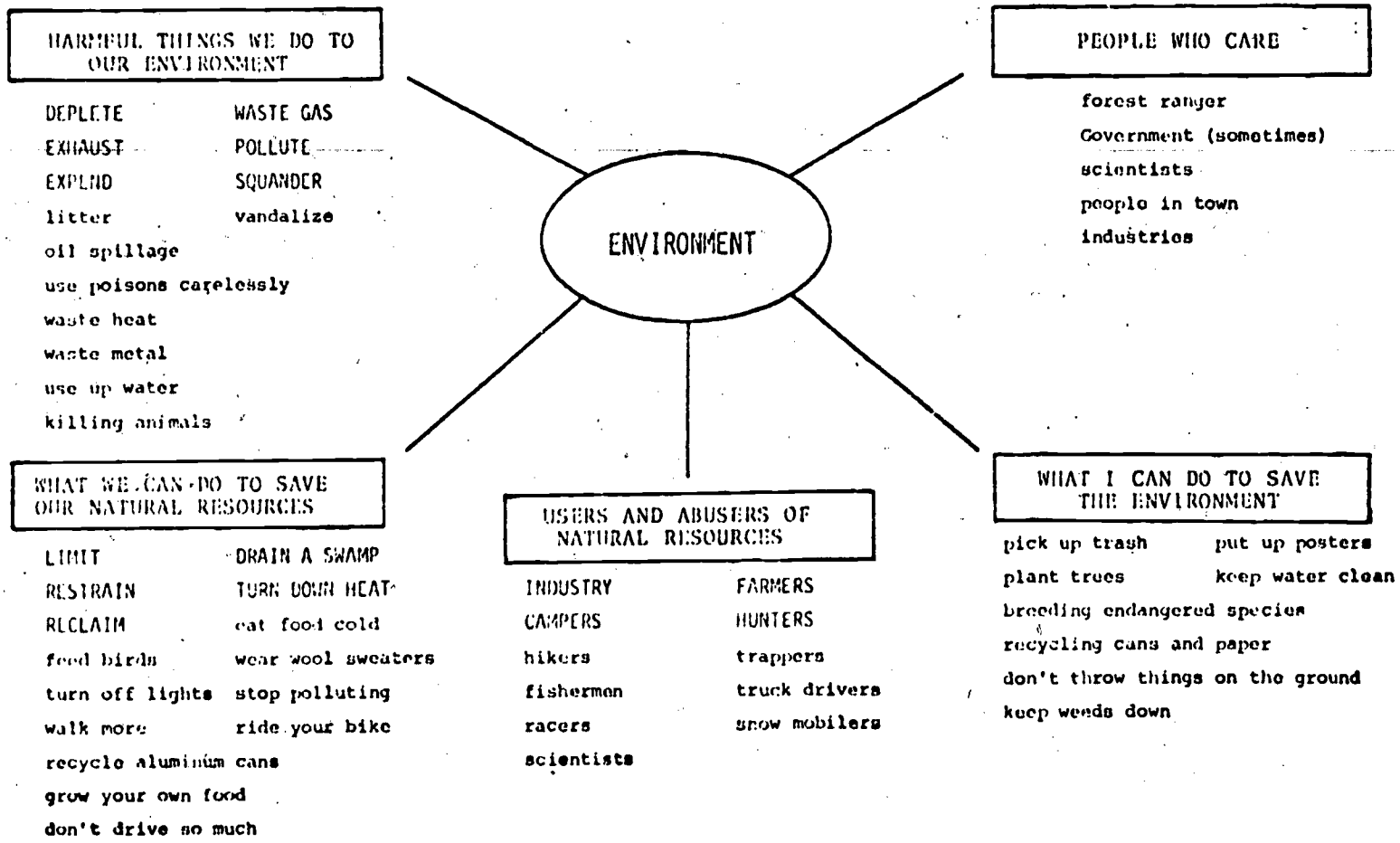

Figure 5. A composite of responses to the Semantic Map-- Environment from one classroom that participated in the study. (The words that are listed under the categories in lower case were generated by the students.)

textually specific word meanings, refocused semantic maps help students become familiar with the text-specific word meanings through association with a central concept (Hagen, 1979). The teacher initiates refocusing by giving several related concept words so that when the map is finished, text comprehension will be facilitated. For example, a specific meaning for the word "boom" from a Wisconsin logging history passage might produce a refocused semantic map such as that shown in Figure 6.

Semantic Feature Analysis

Semantic feature analysis capitalizes on the categorical nature of memory structures for individual words and words in prose contexts. This strategy focuses on the ways in which words within a category are alike and different and, through discussion, relates their meanings to prior knowledge (Johnson & Pearson, 1978). In semantic feature analysis, vocabulary is presented in a logical, classified way. The grids display relationships between words as well as finer nuances within and between concepts. An illustration of a completed semantic feature analysis grid for environment is shown in Figure 7.

Clark (1973) concluded that, as a child's age and experiences increase, there is a concomitant progression toward the acquisition of differentiated features of word meanings. Therefore, in more sophisticated grids, the + and - notations would be replaced by numerical ratings (e.g., 1-5) to indicate varying degrees of rela-

Text: During a severe thunderstorm, a boom might become dislodged.

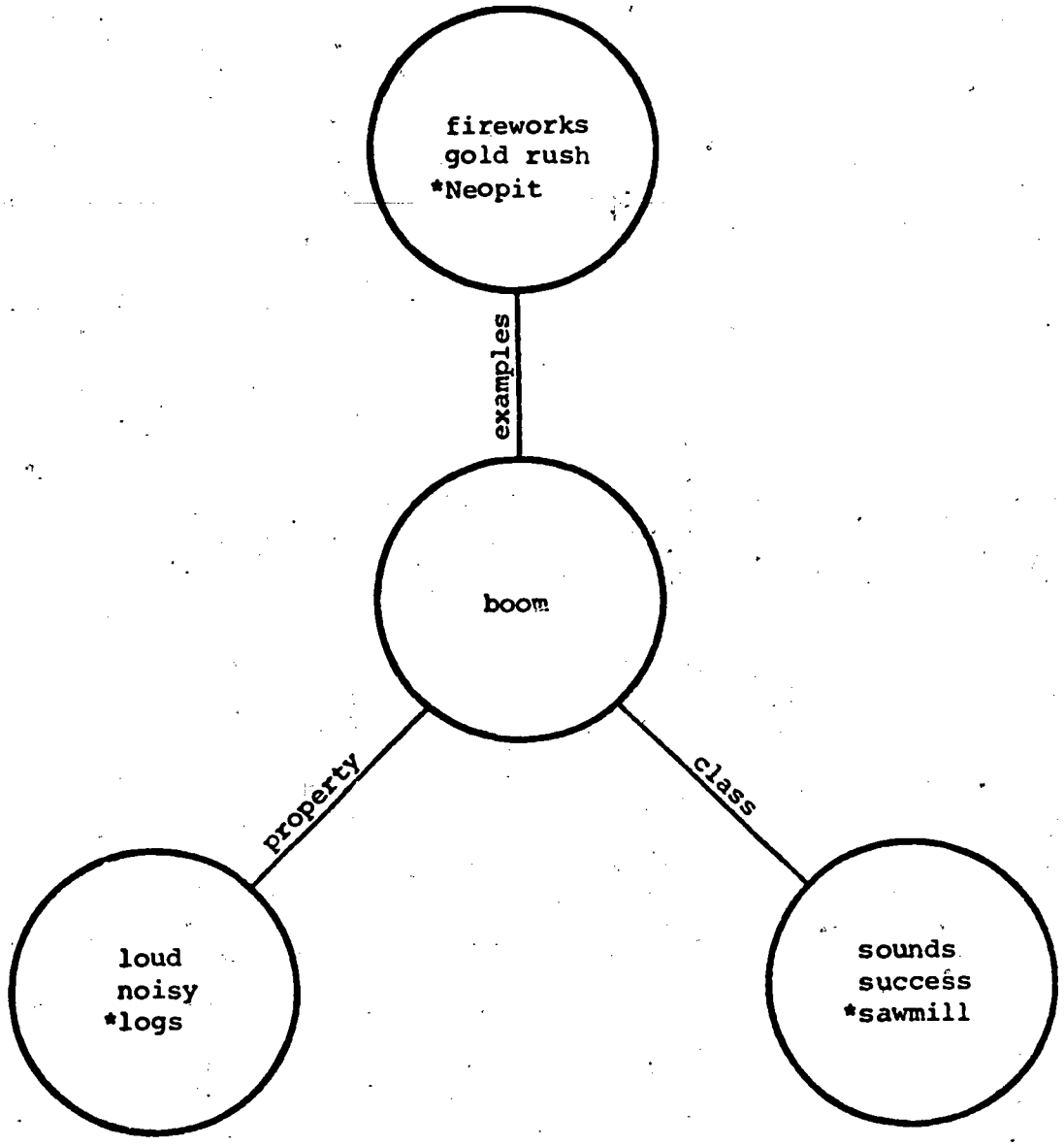

Figure 6. Refocused semantic map of "boom."

*Refocused concepts.

WISCONSIN RESEARCH & DEVELOPMENT CENTER

Week III, Lesson 3b

Name Classroom Copy

Teacher _____

ENVIRONMENT

EXAMPLES OF ACTS THAT HELP THE ENVIRONMENT

ACTS THAT HELP THE ENVIRONMENT	STAY WITHIN LIMITS WHEN FISHING	DRAIN A SWAMP FOR FARMLAND	SAVE FUEL BY TURNING DOWN HEAT AND WEARING A SWEATER	IRRIGATE A DESERT	CONSERVATIONISTS PLANTING TREES	CAREFUL CAMPERS	throw away garbage	help animals	solar heat	Converters Autos	land-fill	lights-electricity	non-waste						
CONSERVE	+	-	+	-	+	+	?	+	+	+	?	+	+						
LIMIT	+	-	+	-	-	+	-	-	-	-	-	-	-						
RESTRAIN	+	-	+	-	-	+	-	-	-	-	-	-	-						
RECLAIM	-	+	-	+	+	?	?	+	+	+	+	+	+						
restore	?	-	-	-	+	?	?	+	+	+	+	+	+						
preserve	+	-	+	-	+	+	+	+	+	+	+	+	+						
recycle	+	-	-	+	-	+	+	-	+	+	-	+	+						
produce	+	+	+	+	+	+	+	+	+	+	+	+	+						

Figure 7. A composite of responses to the Semantic Feature Analysis Grid--Environment from one classroom that participated in the study. (The words that are listed under the categories in lower case were generated by the students.)

tionship.

The general instructional sequence for semantic feature analysis is:

1. Select a topic.
2. List, in a column at the left, some words which relate to that topic.
3. List, in a row along the top, features shared by some of the words in the column.
4. Have students put pluses or minuses in the grid to indicate whether or not each word that is listed in the column shares each of the features that is listed along the top.
5. Encourage students to add additional words and features.
6. Have students complete the expanded matrix with pluses and minuses to indicate whether each word shares each feature.
7. Conduct a discussion of the uniqueness of each word as reflected by the pluses and minuses on the grid.

As with semantic mapping, discussion is an important part of the procedure.

The above explications of possible vocabulary teaching strategies represent only a sampling of some of the available techniques which might activate existing memory structures and processes for word knowledge comprehension. It might be that some of these teaching strategies would be more effective for general vocabulary de-

velopment while others are more effective for text-specific vocabulary development. Research is needed that will determine the utility of these strategies in particular learning situations. The shift in vocabulary studies from a general understanding of vocabulary acquisition to an emphasis on teaching strategies indicates a need by researchers and practioners alike to find ways to help children use what they know to learn more from text.

The present study compared the effectiveness of three specific vocabulary teaching strategies: two alternative prior knowledge methods (semantic mapping and semantic feature analysis), with a conventional method (contextual analysis) on general vocabulary acquisition. This study was conducted as part of the project to "Investigate the Relationships Between Prior Knowledge, Vocabulary Development, and Passage Comprehension with Culturally Diverse Students" at the Wisconsin Center for Education Research. The program of research explores the effectiveness of various vocabulary teaching strategies and analyzes student-learner processes in relating prior knowledge to the acquisition of new vocabulary.

CHAPTER THREE

METHOD

The purpose of the study was to compare the practicality and effectiveness of three specific vocabulary teaching strategies: the two alternative prior knowledge methods of semantic mapping and semantic feature analysis and a conventional method for general vocabulary development, contextual analysis. The two major questions of interest were: (1) Are the two instructional strategies which draw on prior knowledge and capitalize on categorically arranged conceptual frameworks as effective as the traditional approach of contextual analysis for vocabulary building? (2) Does the success of a particular teaching strategy depend on the performance measure taken? Each week subjects were taught a set of fifteen target vocabulary words through one of the strategies. By the end of three weeks, each subject was to be taught a set of vocabulary words through each of the three instructional strategies.

Design

A modified Latin square design was employed in the study. The design was chosen for several reasons (see Figure 8, Instructional Design for Study). First, classrooms were viewed as the proper units when analyzing treatment effects. Second, four classrooms were chosen for each grade level/treatment order combination

A - Semantic Mapping

B - Semantic Feature Analysis

C - Context

D - Control

	Categories 1-3	Categories 4-6	Categories 7-9	
	Week 1	Week 2	Week 3	Week 4
4th Grade:				
Classrooms 1-4	A	B	C	
Classrooms 5-8	B	C	A	Comprehensive
Classrooms 9-12	C	A	B	Test
Classrooms 13-15	D	D	D	
5th Grade:				
Classrooms 16-19	A	B	C	
Classrooms 20-23	B	C	A	Comprehensive
Classrooms 24-27	C	A	B	Test
Classrooms 28-30	D	D	D	
6th Grade:				
Classrooms 31-34	A	B	C	
Classrooms 35-38	B	C	A	Comprehensive
Classrooms 39-42	C	A	B	Test
Classrooms 43-45	D	D	D	

Figure 8. Instructional design for the study.

to allow for reasonable statistical power for assessing between-classroom treatment effects. Third, a within-classroom design was incorporated to allow for an even more sensitive test of treatment effects. Fourth, three grade levels (fourth, fifth, and sixth) were chosen to permit a stable estimate of treatment effects at each of these three intermediate grades. Finally, the Week 4 comprehensive test permitted an assessment of longer term "retention" effects.

Selection and Validation of Categories and Target Words

An initial step in the development of the instructional materials for the study was to select the potential target words that were to be taught during the vocabulary lessons. Since semantic mapping and semantic feature analysis are both based on categorical relationships among words, it was necessary that the target words be presented in semantic categories. The first task in selecting the target words then was the identification of topics or categories of words. An extensive survey of the literature on vocabulary knowledge of inner-city Black children and Menominee Indian children was conducted. One objective of the search was to identify vocabulary words that might elicit unique responses from each of these two student populations in anticipation of future studies in the project. The survey provided general background information on which to begin to base the selection of the

word categories and the target words. Only one "word list" was found (Roberts, 1971) although other sources proved helpful (Anastasiow & Hanes, 1976; Bikson, 1977; Cullinan, 1974; Horn, 1970; Jacobson, 1971). Topics were also chosen that were not specifically related to content area materials for intermediate grade level children. The topics were chosen from current seventh and eighth grade developmental reading texts, and one children's thesaurus, Words to Use (1974). Prototypic semantic maps were developed for each of 12 topics as well as semantic feature analysis grids for selected topics. The 12 topics that were identified were: Animals, Books, Clothes, Communication, Conservation, Consumerism, Health Care, Homes, Money, School, Television, and Water. A minimum of 12 potential target words were generated for each category. Words for each topic were selected using current sixth, seventh, and eighth grade basals, The Ginn Lexicon of Multi-Meaning Words (in press), The Living Word Vocabulary (1976), Word Frequency Book (1971), Webster's New Dictionary of Synonyms (1973), and The American Heritage Dictionary of the English Language (1975). Selection of potential target words within the categories was based on two criteria.

1. The words should be unknown to intermediate grade level children. A word was considered if it was above an eighth grade level. The Word Frequency Book (1971), The Living Word Vocabulary (1976), and the Ginn Lexicon of Multi-Meaning Words (in press) were used to determine word

difficulty.

2. The words should be representative of several of the sub-category headings on each map.

After the categories were determined with potential target words under each category identified, two outside consultants were asked to critique the preliminary semantic maps and word lists of potential target words. Carol Dodge, Assistant Superintendent, Menominee Indian School District, and Cora Marrett, Faculty Associate, Center for Educational Research met with project staff to review the relationships of each category, sub-category, and target word to the cultural background and prior knowledge bases of Menominee Indian and inner-city Black children. They were also asked to suggest new categories, sub-categories, or possible target words that might elicit additional responses based on different cultural and prior knowledge bases.

Both Dr. Marrett and Ms. Dodge have expertise in culturally diverse student populations. They were selected as consultants because subsequent studies investigating vocabulary acquisition will be involved with culturally diverse student populations and it is anticipated that some of the materials will be utilized again.

After a review of the consultant's suggestions, ten categories were selected: Animals, Communication with Language, Environment, Fiction, Health Care, Homes, Schools, Size, Stores, and Water. Within each category, ten words were chosen that could serve as target words (e.g., Environment: expend, restore, re-

vitalize, ravage, deface, reclaim, deplete, squander, restrain, replenish).

In order to assure that the targeted words would be unknown to the subjects in the study, the target words were pilot tested the week of March 16, 1981 in twelve sixth grade classrooms in two midwest, suburban towns. A multiple-choice format task was developed to test the knowledge of the target words. (The Target Word Vocabulary Pre-Test and the Directions for Administration appear in Toms-Bronowski, 1982.) The 100-item test included each target word with four-response definitional choices. The response choices included:

1. a synonym response (correct)
2. a graphically similar response
3. a semantically similar response
4. an unrelated response

After all the tests were scored, the nine categories and 15 target words for each category were identified. The selection of target words and categories was based on the following criteria:

1. Within a category, the five words with the minimum percentage correct were chosen.
2. The reduction from ten categories to nine categories was done by deleting the category whose five target words had the average percent correct that was highest among the ten categories.

Statistical procedures such as item analysis and factor analy-

sis were not employed in chosing the target words because the major criteria of choice was difficulty, as opposed to item-total correlation. While this criteria produced a weak factor structure, it was expected that this would occur due to the tenuous connection between words within categories.

Based on the above analyses of the pilot test, the nine categories and five target words per category were finalized and are shown in Figure 9.

Development of Treatment Materials

Prior to the development of the teaching materials for each of the three treatments, specific definitions for each target word were agreed upon. Several adult dictionaries, The Original Roget's Thesaurus of English Words and Phrases (1965), Webster's Seventh New Collegiate Dictionary (1967), Webster's New Dictionary of Synonyms (1973), The American Heritage Dictionary of the English Language (1975), and Webster's New Collegiate Dictionary (1977), were used. Children's dictionaries were also employed to ensure that the final definitions would be appropriate for intermediate grade level children. These dictionaries included The Holt Intermediate Dictionary of American English (1966), The American Heritage School Dictionary (1972), The Xerox Intermediate Dictionary (1973), Thorndike Barnhart Advanced Dictionary (1974), Thorndike Barnhart Intermediate Dictionary (1974), and the Scott, Foresman Beginning Dictionary (1976). An overview of the lesson plans for

Stores	Water	Communication with Language
exorbitant	placid	saccharine
dear	turbulent	unintelligible
moderate	serene	motivate
proprietor	saline	insinuate
clientele	brackish	deride

Schools	Shelters	Animals
apathetic	rustic	muskie
provocative	dilapidated	wolverine
agog	exquisite	molt
ambivalent	hovel	hoard
lackadaisical	villa	forage

Environment	Fiction	Size
deplete	fanciful	corpulent
squander	enthralling	obese
expend	plausible	immense
reclaim	conjuror	rotund
restrain	sage	diminutive

Figure 9. Categories and target words.

each of the three instructional treatments is presented below.

Semantic Mapping

The prototypic maps that had been generated prior to the selection and validation of the target words were refined using the five target words for each map. Nine maps were finalized and lesson plans for teachers were written for each map. (An example of a semantic map and the corresponding lesson plan appear in Toms-Bronowski, 1982.)

An abbreviated outline of the Lesson Plans for Teachers for Semantic Mapping is presented in Figure 10.

Semantic Feature Analysis

The prototypic feature analysis grids used for the selection and validation phase were used as starter grids for the treatment materials. After the specific definitions for the targeted words were arrived at, it became clear that some of the grids needed major revision. For several of the category areas (e.g., Animals, Communication with Language, Environment, Fiction, Stores, and Water), two grids were needed rather than one due to the constraints imposed by the grid layout. (An example of a semantic feature analysis grid and the corresponding lesson plan appear in Toms-Bronowski, 1982.)

An abbreviated outline of the teachers' Lesson Plans for Semantic Feature Analysis is presented in Figure 11.

Context

Given the many types of context clue types that could have

OBJECTIVE: To introduce new vocabulary words (Definition of the five target words are provided.)

MATERIALS: The Semantic Map copied onto the chalkboard
A copy of the Semantic Map for each child

PROCEDURE:

1. Introduction. Tell the children the topic of the Semantic Map and review the categories that appear on the map.

2. Definition of Target Words and Other Unfamiliar Words; Addition of a Word to Each Category.

3. Independent Work (5 minutes). Have the children work independently adding words and categories to their copies of the map.

4. Class Discussion. Add children's suggestions for additional words and categories to the chalkboard map and discuss them. (Take only a few suggestions at this time.)

5. Review of Target Words and Other Unfamiliar Words. Discuss each of the words using some of the following techniques: synonym, antonym, sentences, cross-category comparisons.

6. Further Additions to the Semantic Map. If time permits, have the children suggest additional words and categories and add these to the chalkboard map.

7. Collect Children's Work.

Figure 10. An abbreviated outline for Semantic Mapping Lesson Plans.

OBJECTIVE: To introduce new vocabulary words (Definitions of the five target words are provided.)

MATERIALS: The Semantic Feature Analysis Grid(s) copied onto the chalkboard
A copy of the Semantic Feature Analysis Grid(s) for each child

PROCEDURE:

1. Introduction. Tell the children the topic of the Semantic Feature Analysis Grid and the type (category) of the words going down the side of the grid and across the top of the grid.

2. Definition of Target Words and Other Unfamiliar Words.

3. Addition of a Word and a Feature to the Grid.

4. Independent Work (5 minutes). Have the children work independently filling in the pluses (+) and minuses (-) on their copies of the grid, and adding new words and features to the grid.

5. Class Discussion. Add children's suggestions to the chalkboard grid. Discuss the pluses (+) and minuses (-) and question marks (?) as they are being filled in. (Take only a few suggestions at this time.)

6. Review of Target Words and Other Unfamiliar Words. Discuss the pluses and minuses that were filled in for each target word. Have the children help you to define each target word in terms of the semantic features that have been marked.

7. Further Additions to the Grid. If time permits, add more of the children's suggestions to the chalkboard grid and fill in all remaining pluses (+) and minuses (-). Discuss each entry as it is made.

8. Collect Children's Work.

Figure 11. An abbreviated outline of Semantic Feature Analysis Lesson Plans.

been chosen for inclusion in the contextual analysis treatment condition, the choice was made to use three explicit and primarily syntactic clue types that consistently reappeared in the literature: direct explanation, appositive, and contrast (Ames, 1966; Humes, 1978; Ives, 1979; McCullough, 1958; Thomas & Robinson, 1977). Figure 12 illustrates the three clue types. In an attempt to control and, therefore, minimize the role that prior knowledge plays when context clues are employed, the words were not taught in categories and the exercises emphasized specific context signals (i.e., direct explanation: "is," "means"; appositive: commas, "or"; contrast: "unlike," "rather than," "while").

The resultant context format included the sentence structure types found in Figure 13, Examples of Context Formats for the target words for Environment.

An abbreviated outline of the Lesson Plans for Teachers for Context is presented in Figure 14. (An example of the context exercises and the corresponding lesson plans appear in Toms-Bronowski, 1982.)

Development of Dependent Measures and Comprehensive Test

Based on the second research question of interest in this study, "Does the success of a particular teaching strategy depend on the performance measure taken?"; three dependent measures were developed, one to reflect each of the three treatment conditions.

Clue Type	Explanation	Example	Miscellaneous (Signals)
Direct Explanation	read like a simplified dictionary entry; explicitly defines terms	1. By kisterness is meant all the words a person knows well. 2. Botinals are words with opposite meanings. 3. The gunnet is not the hero of a story. 4. A genakin is a musical instrument.	-copulative verbs (is, was, means, forms)
Appositive	word, phrase, or dependent clause that restates the immediately preceding text--within same independent clause.	1. The natives believed that tinals, or evil spirits, lives beyond the river. 2. Bevils, not wichets, guarded the gates. 3. He recounted a mimang--an old story with unproven facts. 4. The chaitore, their chosen leader, spoke gravely to the crowd.	-punctuation (parentheses, dashes, commas) -articles, relative pronouns, and words such as or and that is
Contrast	may define an unknown term by explaining what it is not like--unfamiliar terms may be defined by contrasting them to familiar objects, places, people, groups, or ideas, juxtaposes 2 unlike entities (doesn't point out differences)	1. The sumelt on the outside was not like the peace on the inside. 2. I wonder whether the money will be a blessing or a foge. 3. When my book is finished, it will be either thipsnal or ordinary. 4. During the Christian era, music was dominated by the church. About the time of the crusades, however, independent yacule music emerged. (more difficult because processing 2 different parts of speech)	-words such as like, as, and than with a negative (e.g., not like, less than) -negatives (e.g., unlike, differs) -words implying alternatives, such as or and either, rather than, while

Figure 12. **Context clue types.**

Note. **Information in this figure was taken from Humes, A., "Structures, signals, and cognitive processes in context clues."** Researching in the Teaching of English, **1978, 12, 321-334.**

DIRECT DEFINITION

2. To _____ marshy land means to make it fit for farming.

APPOSITIVE

3. They were careful not to _____, or use up, their supply of flour.
7. Dennis _____, or wasted, his allowance last week.

CONTRAST

5. Dan could _____ his temper, unlike Mike who could not control his anger.
6. Rather than _____ all of his energy cleaning the garage, Mark decided not to use up all of his energy on that task.

DIRECT DEFINITION

2. To reclaim marshy land means to make it fit for farming.
   To reclaim means _____

APPOSITIVE

3. They were careful not to deplete, or use up, their supply of flour.
   To deplete means _____
7. Dennis squandered, or wasted, his allowance last week.
   Squandered means _____

CONTRAST

5. Dan could restrain his temper, unlike Mike who could not control his anger.
   Restrain means _____
6. Rather than expend all of his energy cleaning the garage, Mark decided not to use up all of his energy on that task.
   Expend means _____

Figure 13. Examples of context formats.

OBJECTIVE: To introduce new vocabulary words (Definitions of the words are provided.)

MATERIALS: Chalkboard and chalk
A copy of the two Context Worksheets for each child

PROCEDURE:

1. Introduction. Tell the children that they will be learning some new words by using context clues.

2. Explanation of Context Clue Type and Description of Signals.

3. Independent Work (5 minutes). Have the children work independently filling in a word or words in the blank for each of the ten sentences on the worksheet. As the children do each sentence, they should circle the signal.

4. Class Discussion. List the children's suggestions for each blank in a column on the chalkboard. Have the children discuss their reasons for selecting the words. Collect the children's worksheets.

5. Independent Work (5 minutes). Give the children the second worksheet, consisting of ten sentences each having an underlined word. The children should work independently writing a meaning for each underlined word.

6. Class Discussion. For each of the sentences, list the children's meanings for the word in a second column on the chalkboard. Then add the underlined word to the first column on the chalkboard. Discuss that the underlined word has the same meaning as the meaning written on the chalkboard. Compare and contrast some of the other words in the first column with the meaning written on the chalkboard.

7. Review of Target Words and Other Unfamiliar Words. Go over each of the vocabulary words and restate the definition of each of these words.

8. Collect Children's Work.

Figure 14. An abbreviated outline for Context Lesson Plans.

The test formats for each of the three treatment conditions and for the comprehensive test for the target word deplete are presented in Figure 15.

The semantic mapping test format, a clustering task, attempted to emphasize the categorical nature inherent in the teaching format. As seen in the example, the target word deplete was not necessarily the correct response choice. Care was taken to ensure that the word that was "not close in meaning to the other two" came from a different subcategory than the two words that were categorically similar.

The semantic feature analysis test format, a semantic features task, was very similar to the teaching format. The descriptions for each of the target words were drawn specifically from the grids with very few exceptions.

The context test format was a sentence completion task or word usage task. The contextual situation in the sentences was not related to the categories as presented in the semantic mapping or semantic feature analysis conditions (i.e., deplete was not presented within an environment context). The second criteria for this test construction was that the target word should be tested in a manner other than the one used during instruction. Therefore, since deplete was tested through direct explanation, the word had been presented either through apposition or contrast in the instructional setting.

The comprehensive vocabulary test given during the fourth week

Semantic Mapping

For each item below, read all three words. Two of the words are very close in meaning. Find the word which is not close in meaning to the other two. Then circle that word.

1. conserve deplete reduce

Semantic Feature Analysis

Read each word and the descriptions under the word carefully. Decide which answer best describes the word. Then put a check on the line in front of that answer.

1. deplete

_____ is when people plant new trees for firewood

_____ is when industry cleans up garbage in lakes

_____ is when industry uses up large supplies of gasoline

Context

Read each sentence carefully. Notice that there is a word missing. Below each sentence there are three word choices. Read each of the word choices and find the one that best completes the sentence. Then circle that word.

1. To deplete something means to _____.

give it away use it up take it apart

Comprehensive Test

Read the vocabulary word. Underneath that word are four word choices. Read each of the word choices and find the one that is closest in meaning to the vocabulary word. Then put a check mark (✓) in front of your answer.

1. deplete

_____ a. use up

_____ b. protect

_____ c. dig a hole

_____ d. deposit

Figure 15. Weekly dependent measures and comprehensive test item for target word deplete.

of the study was a revised edition of the original pretest used for selection of target words. The multiple-choice, definition format was chosen as a format that would not be biased in favor of any one of the treatment conditions.

Development of Additional Evaluation Instruments

Qualitative information about each of the treatment conditions, categories, and target words was also desired. Information about teachers' reactions as well as their perceptions of student involvement was sought. As a result, evaluation forms for each lesson under each treatment condition were developed as well as a final evaluation form for the three weeks. (Sample lesson evaluation forms and final evaluation form appear in Toms-Bronowski, 1982.)

Subject Selection

Subjects for the experimental treatment conditions were children from 36 (intermediate grade level) classrooms (four, five, and six). All the intermediate grade level classes from two standard, middle-class, midwestern school districts and representing twelve classrooms at each grade level participated in the study. One school district had separate fourth, fifth, and sixth grade classes. The other school district had combined fourth-fifth and fifth-sixth grade classes. Children from seven other intermediate grade level classrooms from a third midwestern, suburban school served as the control condition.

Assignment of Classes to Treatment Groups and Assessment Administration

Each of the 12 classrooms at each grade level were randomly assigned to one of the three treatment orders (i.e., ABC, BCA, CAB). The possible treatment orders at each grade level were identical. Each classroom, therefore, received all three vocabulary teaching method treatments in counterbalanced order.

The 43 classrooms (36 treatment condition classrooms, 7 control classrooms) were tested with three dependent measures, each designed to reflect the focus of a particular teaching strategy, at the end of each of the first three weeks of the study. The weekly test-order assignments were based on the condition that the analogous dependent measure for each treatment condition was given last in order of presentation (see Figure 16, Assessment schedule). For example, the classes that received the semantic mapping treatment for any of three weeks received the dependent measures assessment in either a BCA or a CBA order. The orders were randomly assigned to classes within grades. The decision to give the analogous dependent measure last limited the number of test-order presentations from a possible 36 treatment-test order combinations or six test-order combinations to two test-order combinations.

The study was conducted over a four-week period in April-May 1981. Three 30-45 minute vocabulary lessons were presented each

A - Semantic Mapping

B - Semantic Feature Analysis

C - Context

D - Control

Treatment Group	Assessment Schedule			
	Week 1	Week 2	Week 3	Week 4
ABC	BCA CBA	CAB ACB	ABC BAC	Comprehensive Test
BCA	CAB ACB	ABC BAC	BCA CBA	Comprehensive Test
CAB	ABC BAC	BCA CBA	CAB ACB	Comprehensive Test
Control	D(ABC)	D(BCA)	D(CAB)	Comprehensive Test

Figure 16. Assessment schedule.

week for three weeks. The subjects were tested at the end of each week on each of the three dependent measures. A comprehensive multiple-choice definition test was administered a week after the last lesson so that both short-term and long-term retention was assessed. The control condition classrooms received the three dependent measure tests weekly, as well as the comprehensive test.

Administration of Treatments

On Wednesday, April 22, 1981, and Thursday, April 23, 1981, one-hour workshops were held for the two school districts involved in the treatment conditions. Teachers were acquainted with the general purposes of the research project. Then they were taught model lessons for each of the three teaching strategies using examples from the actual lessons they would be teaching during the first week. Time was also allowed for questions and comments. The agenda for the inservice appears in Figure 17, Workshop Agenda.

All treatment lessons, weekly assessment measures, and the comprehension assessment measure were conducted during the four-week time period from May 4, 1981, through May 29, 1981. The three treatment sessions and the weekly assessment measure were executed on four consecutive days during each of the three weeks of instruction. Project staff observed some of the vocabulary lessons during the three weeks of treatment sessions.

The comprehensive assessment measure was given seven days after the third weekly assessment measure.

Brief Description of the Study

Schedule of Lessons

Evaluation Form

Brief Overview of the Three Treatments

Context

Semantic Mapping

Semantic Feature Analysis

Demonstration of Activities from Week One

Semantic Mapping

a) Outline of Lesson Plans

b) Sample Lesson

Semantic Feature Analysis

a) Outline of Lesson Plans

b) Sample Lesson

Context

a) Outline of Lesson Plans

b) Sample Lesson

Questions and Answers

Figure 17. Workshop agenda.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results of the study and a discussion of the findings. The information is organized by first presenting the data analysis procedures. The results and a discussion of the results follow for both research questions.

Data Analysis Procedures

The data analysis procedures were finalized after the determination of the final sample size for the study. The results of the Control Group data analyses are then presented. The section ends with an explanation of the types of treatment group analyses.

Sample Size

The sample size for the study was based on three considerations. The first consideration, the absenteeism criteria, was used to determine the eligibility of individual subjects for formal data analyses. These criteria were as follows.

1. If a subject was absent for one or more days of instruction during a week, the subject's weekly test scores for that week were removed from the data analysis.
2. If a subject was absent for any of the nine days of instruction, the subject's comprehensive test score was removed from the data analysis.

3. If a subject attended all nine days of instruction, but was absent for any of the weekly tests, the subject's comprehensive test score was still included in the data analysis.

The second consideration, also an eligibility criterion, was that any students labeled as "learning disabled" by the school district were eliminated from the formal data analysis procedures.

The third consideration which affected the final sample size involved the Control Group. Due to complications in scheduling, two classrooms from the original nine classes that formed the Control Group were lost. Therefore, there were only seven classes in the no treatment control condition (four fourth, one fifth, and two sixth-grade classes), so that high power was not expected. Due to the above consideration and the fact that the Control Group was comprised of classes from a third school district which was not involved in any treatment condition, the Control Group data were not analyzed in conjunction with the treatment condition classes. The final sample size for the formal analyses of Research Question One and Two were the 36 treatment classrooms.

Control Group Analyses

Descriptive analyses were performed at the class level on the dependent measure data for the Control Group. The descriptive analyses indicated that the Control Group performed well below all treatment groups on all dependent measures as would be expected

for a no-treatment Control Group (see Tables 3, 4, and 5). The analysis indicated that the sixth grade scored higher than the fifth grade in number correct on the comprehensive test and the fifth grade tended to be above the fourth grade (see Table 6). A median polish indicated that as grade level increased percent correct on the comprehensive test also increased. A median polish is an exploratory data analysis procedure that alternately extracts medians from the rows and columns in a two-way table to determine the types of findings that might be expected from later statistical analyses of data (Tukey, 1977, pp. 331-442).

Types of Treatment Group Analyses

The design for this study was a modified 3 x 3 Latin square (refer to Figure 8, p. 43). Because part of the design was a 3 x 3 Latin square, it was decomposed into three main effects: Order Group, Method (treatment) and Week (words), plus one residual effect that represented 2 and 3 factor interactions (Winer, 1971, p. 686). A repeated measures analysis of variance was utilized to analyze all dependent measure data (Winer, 1971, p. 696).

Results from the descriptive analysis indicated that there was a great deal of variance between classrooms (refer to Tables 4 and 5). It was quite evident that some classes consistently performed at a higher level than others on all dependent measures in spite of the fact that both schools grouped their classes heterogeneously. Because the data displayed a negative skew, several

Table 3

Performance of Control Group on Dependent Measures

Grade	Class	Week I	Week II	Week III	Comprehensive Test
Fourth	1	49.70	41.98	46.22	27.47
	2	54.14	42.04	44.26	30.51
	3	54.60	43.02	51.11	37.95
	4	50.37	42.67	46.89	25.71
Fifth	5	53.99	45.97	52.08	35.56
Sixth	6	59.26	57.56	66.24	45.80
	7	67.22	60.70	66.67	56.44

Note. All scores are class mean percentage scores on 45-item tests.

Table 4

Performance by School X on Dependent Measures

Grade	Order Group	Week I	Week II	Week III	Comprehensive Test
Fourth-	ABC	75.73	71.28	72.99	69.54
Fifth	ABC	64.72	58.35	67.66	55.98
	ABC	75.48	66.67	73.91	68.02
	ABC	84.92	82.14	80.36	77.86
	BCA	74.40	58.49	68.62	63.89
	BCA	77.61	58.93	64.77	58.89
	BCA	80.80	65.42	67.04	71.72
	CAB	67.08	60.37	77.38	58.44
	CAB	65.04	62.13	71.98	58.04
	CAB	69.66	63.38	71.71	61.87
Fifth-Sixth	ABC	84.21	67.36	73.37	65.98
	ABC	82.04	71.11	75.80	70.09
	ABC	79.35	77.13	77.33	74.62
	BCA	80.77	64.37	70.87	62.31
	BCA	82.00	71.42	82.56	72.62
	BCA	75.73	59.06	71.67	62.50
	CAB	75.97	62.80	75.79	67.02
	CAB	68.17	61.40	67.98	62.06
	CAB	70.37	72.76	78.60	74.37

Note. All scores are class mean percentage scores on 45-item tests.

Table 5

Performance by School Y on Dependent Measures

Grade	Order Group	Week I	Week II	Week III	Comprehensive Test
Fourth	ABC	68.99	77.11	76.22	76.00
	BCA	75.56	54.33	73.33	65.66
	BCA	67.44	54.39	64.35	55.27
	CAB	65.46	65.60	73.23	60.77
	CAB	68.28	61.76	72.78	60.80
Fifth	ABC	70.22	72.72	71.11	65.40
	ABC	72.78	68.89	72.50	60.00
	BCA	77.36	60.56	66.01	59.70
	BCA	76.73	60.53	68.63	62.43
	CAB	66.67	53.33	70.53	58.94
	CAB	63.39	59.48	66.83	56.33
Sixth	ABC	80.68	77.07	71.20	53.76
	ABC	87.05	83.98	86.20	88.70
	BCA	82.80	81.64	85.37	86.28
	BCA	71.02	57.95	68.55	54.84
	CAB	75.21	63.82	74.36	77.24
	CAB	75.97	72.09	79.91	67.54

Note. All scores are class mean percentage scores on 45-item tests.

Table 6

Control Group Means on Comprehensive Test

Grade	Week 1	Week 2	Week 3
4	4.00	4.91	4.81
	3.73	3.73	4.91
	3.71	4.86	3.00
	5.62	5.00	6.46
5	6.06	3.94	6.00
6	7.85	6.80	11.20
	6.53	5.06	8.00

Note. Means given in terms of three scores, 0-15, for each of three sets of 15 target words.

N = 7 classes

transformations (i.e., arcsine, Greenhouse-Geisser, logit) were performed. Analysis of the original data was quite comparable to the transformed data; therefore, all analyses are presented for the original data. Some median polishes and elementary randomized block analyses showed that although there was large variability from class to class, the pattern of means on the comprehensive test data was Semantic Feature Analysis, Semantic Mapping, and Context for each of grades four and five, five and six, four, five, and six. Thus an essentially statistical effect appeared when the large number of classes was considered.

In order to respond to Research Question One, the repeated measures ANOVA for the within-classroom analysis, the data were blocked on Order Group and Treatment (method). The 45-item comprehensive test was divided into three word sets, each with a possible score of 0-15, and then rearranged to represent the 15 target words taught within each week. By arranging the data in this manner, it was possible to look at treatment effects. The factors for the within-classroom analysis were: Treatment, Words (W1, W2, W3), and Residual. The Residual, analyzed as a main effect, was a mixture of two-factor and three-factor interactions that could not be analyzed separately. The Residual indicates interactions of Order Group, Treatment, and Words. For the between-classroom analysis the data were blocked on Order Group and Grades. Each school was treated separately as one school had combined fourth-fifth and fifth-sixth grade classes and the other school had

separate fourth, fifth, and sixth-grade classes. The between class factors were: School, Grade within School, and Order Group.

The final analyses were performed with the Bmdp4v program (Dixon, 1981), which allows for the nesting of grades and computes standard adjustments for univariate analyses. Since the sphericity tests were met (cell variances were reasonably homogeneous for logits and the classes were assigned to orders in a nearly balanced way), classical univariate analysis with post ANOVA t-tests was used (Winer, 1971). Comparable analyses were performed on the weekly dependent measures data in order to respond to Research Question Two.

Research Question One Results

Are the two instructional strategies, Semantic Mapping and Semantic Feature Analysis, as effective as the traditional approach of Contextual Analysis for vocabulary building?

It was clear that the Semantic Feature Analysis groups performed at higher percentage levels on more target words than did either of the other treatment groups on the comprehensive test (see Table 7). A descriptive presentation of data for performance on the Comprehensive test indicated that the three treatments differed. Semantic Feature Analysis had a mean score of 10.45 correct; Semantic Mapping, 9.91; and Context, 9.60. Each mean differed from the others at the .05 level (LSD = .26, on 43 df).

Table 7

Percent Correct for Target Words on Comprehensive Test by Treatment Group

Semantic Feature Analysis		Semantic Mapping		Context	
Target Word	% Correct	Target Word	% Correct	Target Word	% Correct
sage	93.0	obese	92.5	muskie	92.2
obese	91.2	muskie	90.0	obese	91.3
saline	89.0	sage	88.0	sage	89.2
muskie	88.3	rotund	82.0	conjurer	87.5
conjurer	88.1	conjurer	82.0	saline	82.0
turbulent	86.0	saline	81.3	lackadaisical	81.0
brackish	85.0	dear	80.1	hovel	79.3
corpulent	84.1	hovel	80.0	rotund	79.0
deride	82.0	corpulent	79.2	diminutive	79.0
dear	82.0	brackish	79.0	brackish	78.1
immense	81.0	exorbitant	77.0	deplete	75.0
hovel	80.4	molt	76.0	squander	74.2

(continued)

Table 7 (continued)

Semantic Feature Analysis		Semantic Mapping		Context	
Target Word	% Correct	Target Word	% Correct	Target Word	% Correct
diminutive	79.3	turbulent	75.3	dear	72.0
insinuate	79.1	deride	75.0	corpulent	70.4
squander	77.0	diminutive	74.3	immense	70.0
agog	76.0	forage	74.0	molt	69.5
molt	76.0	immense	74.0	plausible	69.3
exorbitant	75.1	deplete	72.5	ambivalent	69.1
ambivalent	72.5	wolverine	69.3	deride	69.1
rotund	72.0	squander	69.1	expend	68.0
serene	71.2	lackadaisical	68.1	fanciful	65.0
deplete	71.0	agog	68.0	turbulent	63.0
expend	71.0	dilapidated	66.0	insinuated	62.0
forage	70.6	moderate	64.4	exorbitant	61.0

(continued)

Table 7 (continued)

Semantic Feature Analysis		Semantic Mapping		Context	
Target Word	% Correct	Target Word	% Correct	Target Word	% Correct
clientele	68.3	proprietor	64.1	dilapidated	61.0
fanciful	68.1	fanciful	63.4	reclaim	60.3
proprietor	68.0	villa	63.1	foraged	60.0
lackadaisical	67.3	expend	62.3	enthralling	60.0
rustic	67.0	hoard	62.0	wolverine	59.0
villa	65.3	reclaim	62.0	villa	56.0
moderate	65.0	clientele	61.0	clientele	55.3
wolverine	63.0	serene	60.0	serene	53.2
exquisite	62.0	insinuate	60.0	restrain	53.0
reclaim	60.3	plausible	59.0	motivate	52.5
dilapidated	60.0	rustic	57.0	moderate	52.5
plausible	57.0	ambivalent	54.0	hoard	51.0

(continued)

Table 7 (continued)

Semantic Feature Analysis		Semantic Mapping		Context	
Target Word	% Correct	Target Word	% Correct	Target Word	% Correct
unintelligible	56.1	placid	51.2	agog	51.0
enthralling	53.0	exquisite	51.0	exquisite	47.5
apathetic	52.0	restrain	50.2	proprietor	47.5
placid	51.0	unintelligible	48.5	unintelligible	46.4
restrain	49.2	enthralling	48.0	rustic	44.0
hoard	47.0	saccharine	42.4	apathetic	43.0
saccharine	44.0	apathetic	40.3	saccharine	41.0
motivate	42.0	motivate	37.3	placid	40.0
provocative	33.0	provocative	33.2	provocative	35.5

Note. N = 36 classrooms

Treatment Comparison Results

The within-classroom analysis resulted in three extracted factors: for Method (treatment effects), for Words, and for Residual. The results of the ANOVA for within-classroom analysis are presented in Table 8. The results show large differences among Methods and Words and two interactions with Classes. Statistically, there was a large Method effect ($F = 18.94$, $p < .001$). Method did not interact with School ($F = .58$, $p = .56$) or with Grade ($F = 1.17$, $p = .33$). Tables 9, 10, 11, and 12 show the mean scores by Order Group for Method, Method by School, and Method within Grade by School.

The interaction of Words by Grade nested within School ($F = 2.84$, $p = .020$) indicated that the numeric difference between words varied more than would be expected. The magnitude of this interaction was about the same in both schools, therefore, the interaction did not arise from one aberrant grade. The interaction, Residual by Grade nested with School ($F = 2.99$, $p = .016$), also varied from grade to grade. Some aspects of this interaction may be attributed to interactions in Order Group by Treatments, Order Group by Words, and Treatment by Words. These two interactions were quite small when compared with Method and Words effects.

All teachers in the study were given Evaluation Forms each week as well as a final evaluation form at the end of the third week of lessons. The Evaluation Forms provided invaluable substantive insights regarding the effectiveness of each teaching strategy.

Table 8

Within-Classroom ANOVA for Comprehensive Test

Source	df	MS	F	p
1. Method	2	5.68	18.94	.000**
2. Method X School	2	.17	.58	.56
3. Method X Grade/ School	6	.35	1.17	.33
4. Words	2	26.25	87.48	.000**
5. Words X School	2	.47	1.57	.22
6. Words X Grade/ School	6	.85	2.84	.020*
7. Residual	2	.62	2.06	.14
8. Residual X School	2	.14	.48	.62
9. Residual X Grade/ School	6	.96	2.99	.016*
10. Error	42	.3000		

Note. N = 36 classrooms

*p < .05

**p < .001

Table 9

Mean Scores for Method by Treatment Group

Order Group	Semantic Mapping		Semantic Feature Analysis		Context	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
ABC	10.34	1.59	9.87	1.33	10.99	1.47
BCA	10.61	1.26	10.44	1.26	8.70	1.69
CAB	8.79	1.15	11.04	.90	9.13	1.37
Total	9.91	1.54	10.45	1.24	9.61	1.79

Note. N = 12 classes for each Treatment Group

Table 10

Mean Scores for Method by School

Order Group	Semantic Mapping		Semantic Feature Analysis		Context	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
School X						
ABC	10.36	1.18	9.26	1.24	10.93	.59
BCA	10.84	.98	10.59	.67	8.74	1.45
CAB	8.76	.93	10.94	.96	9.35	1.13
Total	10.01	1.33	10.40	1.08	9.74	1.41
School Y						
ABC	10.32	2.21	10.02	1.58	11.09	2.32
BCA	10.37	1.55	10.29	1.73	8.65	2.05
CAB	8.83	1.42	11.13	.92	8.90	1.64
Total	9.81	1.78	10.51	1.43	9.46	2.16

Note. N = 12 classes for each Treatment Group

Table 11

Mean Scores for Method by Grade (School X)

Order Group	Semantic Mapping		Semantic Feature Analysis		Context	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Grades 4 & 5						
ABC	9.83	1.37	9.95	1.61	10.92	.75
BCA	10.72	.80	10.40	.81	8.24	1.32
CAB	8.35	.92	10.35	.60	8.35	.19
Total	9.65	1.39	10.21	1.06	9.35	1.56
Grades 5 & 6						
ABC	11.07	.23	9.50	.76	10.93	.46
BCA	10.96	1.31	10.78	.60	9.24	1.66
CAB	9.17	.90	11.54	.94	10.34	.46
Total	10.40	1.22	10.61	1.12	10.17	1.16

Note. N = 6 classes for each Treatment Group

Table 12

Mean Scores for Method by Grade (School Y)

Order Group	Semantic Mapping		Semantic Feature Analysis		Context	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Grade 4						
ABC	10.06	-	10.56	-	12.94	-
BCA	10.22	1.18	10.05	1.72	7.85	.81
CAB	9.14	1.02	10.78	.45	8.07	.78
Total	9.76	.96	10.44	.96	8.96	2.30
Grade 5						
ABC	9.61	1.66	9.44	.80	10.44	.35
BCA	9.80	.73	9.97	.26	8.18	.86
CAB	7.24	.10	10.62	.61	7.90	.22
Total	8.89	1.51	10.01	.71	8.84	1.31
Grade 6						
ABC	11.15	3.78	10.33	2.85	10.82	4.13
BCA	11.09	2.89	10.84	3.31	9.93	3.82
CAB	10.11	.73	11.98	1.20	10.73	1.68
Total	10.78	2.22	11.05	2.16	10.49	2.66

Note. N = 6 classes for each Treatment Group

As part of the final evaluation questionnaire, teachers were asked to rank order the three treatments for effectiveness in teaching the target words and to rank order student and teacher enjoyment of the strategies.

The most enjoyed activity as perceived by teachers for both themselves and their students was Semantic Mapping and it was mean rank ordered as (1.81) from a possible rank ordering of one to three for teaching effectiveness. According to the results of the questionnaire, it appeared that Context was viewed as an effective teaching strategy by teachers. However, the teachers did not feel Context was most enjoyable as a teaching activity for them and, indeed, thought it was the least enjoyed activity for their classes. Unfortunately, there was no question on the final evaluation form where teachers could rank order the teaching effectiveness for the context clue types taught within the Context treatment condition. A descriptive presentation of the dependent measure data indicated that the direct explanation and appositive context clues were the more effective of the three clue types presented. The third clue type was contrast. The weekly tests indicated that those words taught through appositive and tested through direct explanation ranked highest in percentage scores. The comprehensive test indicated the reverse; those words taught through direct explanation and tested through appositive ranked highest.

Results of the analyses performed indicated that there were large Method or Treatment effects. In response to Research Question One: "Are the two instructional strategies which draw on prior knowledge and capitalize on categorically arranged conceptual-frameworks as effective as the traditional approach of contextual analysis for vocabulary building?", the data suggest a positive response. Both Semantic Feature Analysis and Semantic Mapping were more effective than Context for general vocabulary acquisition as measured in the study. Semantic Feature Analysis produced significantly higher results than Semantic Mapping and Semantic Mapping produced significantly higher results than Context.

Word Order Effect

There was an extremely large and unanticipated Words effect ($F = 87.48$, $p < .001$). The means scores on the Comprehensive test for Week I Words were 9.97; Week II Words, 9.12; and Week III Words, 10.88. Each mean differed significantly from the others at the .05 level (LDS = .26, on 42 df). Inspection of the data showed that subjects did best on Week III words and poorest on Week II words. A question that arose was: Why did Week II differ to such a great extent from Weeks I and III? Given that the treatments were balanced, the factors altered by week were the fifteen targeted words, the categories the target words appeared in (for Semantic Mapping and Semantic Feature Analysis) or the sentences in

which the target words appeared (for Context). Since the design was originally blocked on time units by week, it was also, in effect, blocking on lessons, categories, and target words.

A second question, then, was: Are the target words for Week II substantially different than the target words for Week I or Week III? The criterion for selection of target words was word difficulty. The word order effect was not, however, a direct function of word difficulty as determined by the vocabulary pre-test for the study. In fact, the mean for the Week II words was lower than the means for the Week I or Week III words on the vocabulary pre-test, indicating that the Week II words were actually easier. From descriptive statistics it was obvious that the three word sets were identical in difficulty. However, for the sample population in the study including the Control Group, the Week II word difficulty profile indicated the words to be uniformly more difficult than as assessed through the pre-test. Although the Week II words contained some of the lower words, the easy Week II words were also more difficult than the Week I or Week III words. The four classes in the Control group with the highest number correct and, therefore, performances most like the treatment groups tended to have the pattern for weeks (Words effect) Week 3 > Week 1 > Week 2. It should be noted that the three lowest Control classes (below one-third correct) did not follow the Week (Words) pattern.

If the Week II words are considered by treatment condition in percentage scores on the comprehensive test, several things may be noted (refer to Table 7). For the Semantic Mapping condition, seven of the lowest ten words were Week II words. For both the Semantic Feature Analysis and Context conditions, six of the lowest ten words were Week II words. Therefore, regardless of treatment condition, nearly half of the Week II words were consistently lower across treatments than would be expected if all three sets of words were rank ordered given comparable levels of difficulty.

The very large Word order effect raised several substantive questions about the nature of the words, categories, and lessons taught during Week II of the study. As previously discussed the word difficulty level for the target words was higher for the Week II words than had been expected from the pilot testing. There does not appear to be any obvious reason for the phenomenon when considering the individual words. However, one implication about the nature of the Week II words necessitated considering the word function classes to which the words belonged. The 45 target words in the study represented eight nouns, 26 adjectives, and 11 verbs. Word class functions for target words were not controlled for within the design of the study. The Week II words included 12 adjectives and three verbs. Nearly half of the adjectives taught were Week II words, and nearly one-third of the verbs were also Week II words. Week I words included six nouns, six adjectives, and three verbs.

Week III words included two nouns, eight adjectives, (including the five Size words), and five verbs (all the Environment words). Considering that so few nouns were taught, it should be noted that on the comprehensive test, nearly half of the nouns were represented in the top 75% correct (i.e., four nouns--Semantic Mapping; four nouns--Semantic Feature Analysis; three nouns--Context), and all nouns were represented above the 50% correct except under the Context condition (i.e., proprietor--47.5%).

There were four lessons in the Semantic Mapping and Semantic Feature Analysis condition where entire lessons were made up of words from one word class. The lessons were Schools (Week II; adjectives), Water (Week II; adjectives), Size (Week III; adjectives), and Environment (Week III; verbs). If the two lessons from Week III are considered, it appears that the adjectives were easier to learn in this study than were the verbs. For the Week II words, where the Word order effect is present, the two lessons which represent all adjectives gave a very different impression than the Week III adjective lesson. The Water adjectives were learned fairly well if they were taught within categories. The Schools adjectives did not fare as well regardless of treatment condition. The third lesson in Week II, which was Communication with Language, included three verbs and two adjectives. If word class is considered, then it might be expected that the adjectives would rank higher

than the verbs regardless of treatment condition. The trend for the Communication with Language lesson would seem to indicate that the verbs were easier to learn than the adjectives regardless of treatment condition. There was not enough comparable data between Week II and Week III target words to make any clear statements about word class as a function of the Week II Word order effect.

It appears then that another consideration about the nature of the Week II words should be considered. Is the Week II Word order effect a function of the category topics within the Semantic Mapping and Semantic Feature Analysis treatment conditions? Teachers felt that both Communication with Language and Schools were inappropriate topics due to the conceptual difficulty inherent in the categories. The teachers also felt their classes did not learn the target words within these two categories even though they felt the children had prior knowledge of two of the target words in Communciation with Language. Results of the comprehensive test supported teacher predictions. Three Water words, the third topic in Week II, appeared in a cluster above 75% correct on the Comprehensive test for both Semantic Mapping and Semantic Feature Analysis. The other two Water target words appeared in comparable positions for both conditions. It was not atypical for this type of clustering phenomena for words within categories for Semantic Mapping and Semantic Feature Analysis to

occur across weeks. There was no comparable clustering for either of the other two categories within Week II. One reason for this could be attributed to the conceptual level of difficulty of the category topics for Schools and Communication with Language. There was no systematic control for level of difficulty for category topics in the study. It is also difficult to state what type of criteria might have been used to control for conceptual difficulty of categories. The question remains, then, as to the reason for the Word order effect. The fact that the effect exists raises several interesting substantive questions. Given the constraints of the study, these questions remain unanswered.

It should be stressed again, however, that regardless of the presence of the Word order effect, the performance of the Semantic Feature Analysis treatment condition groups was higher across weeks (and therefore, across words) than the Semantic Mapping and the Context condition groups respectively. Though the Word order effect obscured the Treatment effect, the Treatment effect held a large statistical significance. In fact, the Semantic Feature Analysis groups performed very well on the Week II words in comparison to the Semantic Mapping and Context groups. On the weekly dependent measure percentage score data, the Semantic Feature Analysis group answered correctly 13 out of the 15 targeted words at a 70% or above level. The Semantic Mapping group answered nine correctly at or above a 70% level and the Context group answered eight correctly using the same criterion level. The Comprehensive

test showed the Semantic Feature Analysis group with eight correct at a 70% or above level, the Semantic Mapping group with four correct, and the Context group with two correct. The two sets of descriptive information regarding the Semantic Feature Analysis group performances suggests that when teaching difficult words (whether due to an inherent conceptual level of difficulty or perhaps a word function criterion of difficulty) it might be a wise pedagogical choice to use a Semantic Feature Analysis teaching strategy.

In summary both Method (Treatment) and Words were highly significant at the .001 level. The very large Words effect was attributed to the Week II words. For whatever reasons, the Week II words were more difficult than the Week I words, which in turn were more difficult than the Week III words regardless of treatment condition. Treatments differed significantly with Semantic Feature Analysis higher than Semantic Mapping and Semantic Mapping higher than Context. Both of the vocabulary teaching methods which draw on prior knowledge and capitalize on categorically arranged conceptual frameworks were more effective than the traditional approach of contextual analysis for vocabulary building in the reported study.

Grade Level Comparison

The between-classroom analysis yielded three factors: School, Grade within School, and Order Group. The means for Schools (School X: 10.05, School Y: 9.92) were not significantly different,

nor were Grades within Schools (School X: 4th and 5th = 9.73, 5th and 6th = 10.39; School Y: 4th = 9.71, 5th = 9.24, 6th = 10.78). All other between-classroom effects were nonsignificant as shown in the ANOVA Table (see Table 13). Therefore, there were no significant differences between Schools ($F = .01$, $p = .95$), between Grades within Schools ($F = 1.70$, $p = .20$), or between Order Groups ($F = 1.09$, $p = .35$). It was surprising that there were no grade level differences, for at the descriptive level of analyses, there was an indication of grade differences (in School X the 5-6 grades > the 4-5 grades; in School Y the 6 grades > 4 grades > 5 grades). The differences were not supported statistically.

The between grade error term (5.55), as seen in Table 13 was 18.5 times the within grade error term (.30), which indicated that some classes were consistently high and other classes were consistently low. As seen in previous analyses (refer to Tables 4 and 5), there was considerable variability in the class means.

Research Question Two Results

Does the success of a particular teaching strategy depend on the performance measure taken?

A descriptive presentation of data comparing each treatment group's percentage scores on the weekly tests with performance on the Comprehensive test clearly indicated that groups performed at a higher level on the weekly dependent measures (refer to Tables 4 and 5). This trend may be completely due to a time consideration.

Table 13

Between-Classroom ANOVA for Comprehensive Test

Source	df	MS	F	p
1. Order Group	2	6.06	1.09	.35
2. School	1	.04	.01	.95
3. Order Group X School	2	.57	.10	.90
4. Grade/School	3	9.44	1.70	.20
5. Order Group X Grade/School	6	1.64	.30	.93
6. Error	21	5.5536		

NSD

Note. N = 36 classrooms

There was only a one-three day time lapse between treatment presentation and the testing situation. The Comprehensive test, however, was administered from one-three weeks after presentation of the targeted words.

Another descriptive presentation of the data showed that there was a general trend for subjects in the Context treatment to perform at a higher level on the subtest that reflected their treatment condition than the other two subtests (see Tables 14, 15, and 16). This was not as evident for subjects in the Semantic Mapping treatment and was not at all true for subjects in the Semantic Feature Analysis treatment; subjects in the Semantic Feature Analysis condition performed least well on the dependent measure that reflected their treatment. It should be noted, however, that the Semantic Feature Analysis groups performed nearly as well on the Semantic Mapping subtest as did the Semantic Mapping groups.

A within-classroom repeated measures analysis of variance supported the above findings (see Table 17). The analysis was based on mean difference scores where Context was 1.15; Semantic Mapping .45; and Semantic Feature Analysis -.11. The mean difference score was arrived at by taking the mean of the two subtests that did not reflect the treatment given each week from the mean of the subtest that did reflect the treatment for each week for each treatment condition. There was a sizable Interaction effect ($F = 20.54$, $p < .001$) that is comprised of Order Group, Treatment, and Week

Table 14

Performance by Context Groups on Subtest Reflecting Treatment and Comprehensive Test

Week I Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
hoard	98.0	51.0
muskie	98.0	92.2
hovel	95.2	79.3
wolverine	95.0	59.0
foraged	93.0	60.0
molt	89.4	69.5
villa	77.5	56.0
dear	77.1	72.0
rustic	75.0	44.0
exorbitant	72.4	61.0
dilapidated	71.0	61.0
exquisite	70.0	47.5
clientele	60.1	55.3
moderate	41.3	52.0
proprietor	37.0	47.5

(continued)

Table 14 (continued)

Week II Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
deride	89.0	69.1
saccharine	85.0	41.0
unintelligible	84.2	46.4
lackadaisical	80.3	81.0
motivate	78.0	52.5
turbulent	77.2	63.0
saline	76.4	82.0
ambivalent	74.0	69.1
brackish	68.1	78.1
placid	64.2	40.0
insinuated	64.0	62.0
serene	59.4	53.2
agog	55.3	51.0
apathetic	33.1	43.0
provocative	20.0	35.5

(continued)

Table 14 (continued)

Week III Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
sage	93.0	89.2
conjuror	93.0	87.5
fanciful	92.7	65.0
rotund	92.3	79.0
squander	92.0	74.2
deplete	87.1	75.0
obese	85.4	91.3
corpulent	85.0	70.4
immense	79.4	70.0
reclaim	76.0	60.3
restrain	75.3	53.0
enthralling	70.0	60.0
plausible	63.4	69.3
diminutive	62.4	79.0
expend	58.2	68.0

Note. N = 12 classes

Table 15

Performance by Semantic Mapping Groups on Subtest Reflecting Treatment and Comprehensive Test

Week I Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
muskie	93.7	90.0
exquisite	90.2	51.0
wolverine	86.8	69.3
proprietor	85.4	64.1
molt	85.4	76.0
clientele	84.3	61.0
rustic	80.8	57.0
moderate	78.4	64.4
dilapidated	77.0	66.0
hovel	77.0	80.0
exorbitant	74.9	77.0
forage	70.4	74.0
dear	70.4	80.1
hoard	61.7	62.0
villa	49.1	63.1

(continued)

Table 15 (continued)

Week II Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
turbulent	84.6	75.3
saline	83.8	81.3
deride	81.6	75.0
placid	78.3	51.2
brackish	76.8	79.0
unintelligible	76.8	48.5
motivate	75.0	37.3
serene	74.0	60.0
insinuate	70.2	60.0
agog	68.0	68.0
saccharine	61.4	42.4
provocative	54.0	33.2
apathetic	51.8	40.3
ambivalent	46.3	54.0
lackadaisical	41.2	68.1

(continued)

Table 15 (continued)

Week III Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
obese	93.3	92.5
sage	83.7	88.0
rotund	83.3	82.0
fanciful	82.2	63.4
expend	82.2	62.3
restrain	80.4	50.2
conjuror	80.4	82.0
reclaim	77.4	62.0
enthralling	76.3	48.0
corpulent	74.4	79.2
immense	73.3	74.0
diminutive	69.0	74.3
squander	68.5	69.1
plausible	59.2	59.0
deplete	35.2	72.5

Note. N = 12 classes

Table 16

Performance by Semantic Feature Analysis Groups on Subtest Reflecting Treatment and Comprehensive Test

Week I Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
wolverine	94.0	63.0
exquisite	91.7	62.0
rustic	90.0	67.0
villa	90.0	65.3
muskie	88.8	88.3
hovel	87.4	80.4
dilapidated	86.3	60.0
forage	84.0	70.6
exorbitant	81.2	75.1
proprietor	78.0	68.0
molt	74.0	76.0
moderate	70.0	65.0
dear	67.1	82.0
clientele	63.2	68.3
hoard	21.6	47.0

(continued)

Table 16 (continued)

Week II Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
turbulent	88.0	86.0
motivate	85.0	42.0
placid	84.2	51.0
unintelligible	83.0	56.1
saline	80.4	89.0
agog	75.0	76.0
apathetic	75.0	52.0
brackish	75.0	85.0
insinuate	74.3	79.1
serene	74.0	71.2
ambivalent	73.0	72.5
deride	71.2	82.0
saccharine	70.0	44.0
lackadaisical	59.2	67.2
provocative	40.4	33.0

(continued)

Table 16 (continued)

Week III Target Words	% Correct Weekly Analagous Sub-test	% Correct Comprehensive Test
fanciful	94.0	68.1
obese	92.4	91.2
sage	91.0	93.0
rotund	90.0	72.0
conjuror	77.0	88.1
diminutive	76.0	79.3
squander	76.0	77.0
enthralling	74.0	53.0
corpulent	73.0	84.1
immense	67.0	81.0
restrain	58.2	49.2
deplete	57.2	71.0
plausible	56.2	57.0
expend	51.4	71.0
reclaim	51.0	60.3

Note. N = 12 classes

Table 17

Within-Classroom ANOVA for Weekly Dependent Measures

Source	df	MS	F	p
1. Method	2	13.22	43.46	.000**
2. Method X School	2	9.22	.30	.74
3. Method X Grade/School	6	.45	1.48	.27
4. Week	2	.39	1.30	.21
5. Week X School	2	46.12	.02	.98
6. Week X Grade/School	6	.21	.70	.65
7. Interaction	2	6.25	20.54	.000**
8. Interaction X School	2	.21	.70	.50
9. Interaction X Grade/School	6	.30	1.00	.44
10. Error	42	.304		

Note. N = 36 classrooms

**p < .001

interactions. A series of mean polishes that blocked an Order Group X Treatment, Order Group X Week, and Week X Treatment shed no substantive light on the phenomenon.

The mean difference scores resulted in a highly significant F score (76.75, $p < .001$) as presented in the between-classroom ANOVA Table 18. There was an effect of Order Group ($F = 5.75$, $p < .05$) in the weekly dependent measure data unlike the Comprehensive test data. The means for Order Group were CAB = .70, BCA = .46, and ABC = .34. The Order group CAB (Context, Semantic Mapping, Semantic Feature Analysis) performed at a higher level than the BCA and ABC groups respectively. It should be noted that the CAB group where subjects received the Context treatment first fared better than when Context was presented second or third in order of presentation. This phenomenon may, in part, explain why the Context groups' Context subtest resulted in the highest mean difference scores. There was also a small School effect ($F = 4.33$, $p = .05$) where School X (combined 4th and 5th, and 5th and 6th grades) had a significantly higher mean difference score, .57 than School Y (separate 4th, 5th, and 6th grades), .41.

The performance profile may be viewed in two ways. One view is that subjects had practice on two subtests containing the 15 targeted words prior to the subtest that reflected the treatment they had received that week, thereby giving them two practice runs for answering correctly the third subtest. A second view, based

Table 18

Between-Classroom ANOVA for Weekly Dependent Measures

Source	df	MS	F	p
1. Mean	1	20.19	76.75	.000**
2. Order Group	2	1.51	5.75	.010*
3. School	1	1.41	4.33	.050*
4. Order Group & School	2	3.34	.13	.88
5. Grade X School	3	.41	1.57	.22
6. Order Group X Grade/School	6	.55	2.08	.10
7. Error	21	.263		

Note. N = 36 classrooms

*p < .05

**p < .001

on the same notion, is that the subjects had two subtests, alien to the manner in which they were instructed for any particular week, in which to become confused regarding the correct response to target word definitions, thereby creating a confusion factor when responding to their analagous dependent measure. It should be stressed, however, that while the Context condition resulted in high scores on the Context subtest each week, the same treatment fared lowest on the Comprehensive test.

CHAPTER FIVE

SUMMARY, LIMITATION, CONCLUSIONS AND IMPLICATIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter presents a summary of the study and its major limitation. The conclusions and implications that may be drawn from the results given in Chapter Four are also discussed. The chapter concludes with recommendations for future research.

Summary

The summary includes a section on the statement of the problem addressed in the study, the methodology employed in the study, and the results of the study.

Problem

The study was designed to determine the effectiveness of vocabulary teaching strategies on general vocabulary acquisition. Several vocabulary teaching strategies, such as dictionary usage, structural analysis, and context have been shown to be helpful for general vocabulary acquisition and development. Vocabulary teaching methods that capitalize on learner's prior knowledge bases through categorically arranged conceptual frameworks have infrequently been directly investigated. For the purposes of this study, two alternative prior knowledge vocabulary teaching methods, Semantic Mapping and Semantic Feature Analysis, were chosen for comparison with Contextual Analysis, an empirically

proven, effective vocabulary teaching strategy. The purpose of the study was to compare the effectiveness of three vocabulary teaching strategies: Semantic Mapping and Semantic Feature Analysis with a conventional method, Contextual Analysis, on general vocabulary acquisition.

The two major questions asked were:

1. Are the two instructional strategies which draw on prior knowledge and capitalize on categorical conceptual frameworks as effective as the traditional approach of contextual analysis for vocabulary building?
2. Does the success of a particular teaching strategy depend on the performance measure taken?

Method

The methodology discussed in this section includes subject selection, materials development, and the procedures for implementation of the study.

Subjects. The subjects for this study consisted of fourth, fifth, and sixth-grade students in 43 classrooms from three suburban, midwestern school districts. Classrooms, as opposed to individual subjects, were chosen as the unit for analysis. The three treatment condition groups included 12 classrooms at each grade level totalling 36 classrooms. Seven classrooms comprised the Control Group. Classes were randomly assigned to one of three treatment order presentations. The possible treatment orders at each grade level were identical. Each classroom, therefore, received

all three vocabulary teaching method treatments in counterbalanced order during the three weeks of treatment.

Materials. Materials for each treatment condition were developed as group instructional lessons to provide for general vocabulary acquisition. The 45 targeted words included in the study were pilot tested and determined to be unknown to most intermediate grade level children with a comparable sample of 12 classes of sixth-grade children prior to the development of treatment materials. For each of the three weeks of instructional treatment, classes were taught a set of fifteen target words. For both Semantic Mapping and Semantic Feature Analysis, the 15 weekly targeted words were subsumed under three category topics; one topic per lesson to be presented on each of three consecutive days. For the Context treatment, the 15 target words were randomly presented within one of three lesson formats: direct explanation, appositive, and contrast. Therefore, student materials and detailed lesson plans for teachers were designed for three weeks, with three lessons each week, for each of three treatment conditions.

The dependent measures that were developed were the three weekly tests that included three sub-tests and the comprehensive test. Each weekly test included a sub-test for each of the 15 target words that reflected each treatment condition. The comprehensive test was constructed as an unbiased measure of word knowledge and was a modified version of the original vocabulary test used to pretest the target words for inclusion in the study.

Procedures. One-hour workshops were held for the two school districts involved in the treatment conditions. Teachers were acquainted with the general purposes of the study and were taught model lessons for each of the three treatment conditions.

The four-week study was conducted from May 4, 1981 through May 29, 1981. The three treatment sessions and the weekly assessment measures were executed on four consecutive days during each of the three weeks of instruction. The comprehensive measure was given seven days after the third weekly assessment measure.

All data were analyzed initially at an individual subject level. This was done so that students' scores on all dependent measures could be reported back to the classroom teachers in the three school districts. A repeated measures analysis of variance was employed to respond to the research questions.

Results

Research Question One. Results of the classroom analyses indicated that there were differences between the three teaching strategies. The statistical results for treatment effects ($F = 18.94$, $p < .001$) showed that in this study Semantic Feature Analysis was more effective than Semantic Mapping, which in turn was more effective than Context. Therefore, both of the teaching strategies which were based on prior knowledge concerns and capitalized on categorically arranged conceptual frameworks (Semantic

Mapping and Semantic Feature Analysis) were more effective than the traditional approach of Contextual Analysis as measured and analyzed in the reported study.

Research Question Two. Results of the repeated measures analyses indicated that the Context subtests resulted in significantly higher scores for the Context condition subjects. The subtests for the Semantic Mapping and Semantic Feature Analysis conditions did not result in higher performance levels for their respective treatment condition subjects. The descriptive presentation of data indicated that all treatment conditions performed at a higher level on the weekly tests than they did on the comprehensive test.

Limitation

The major limitation of the study was that there were no Control Group analyses in conjunction with the treatment groups. The findings for both research questions were based solely on treatment group comparisons. All the results and conclusions that are reported, therefore, must be considered within a treatment analysis framework. Separate analyses were conducted on the Control group data. The results of these analyses indicated that the no-treatment Control group performed at a significantly lower level than did the treatment groups on all dependent measure data.

Conclusions and Implications

The conclusions and implications of the study are based on the results of the two research questions. The section is, therefore,

dealt with in two parts, one for each research question.

Research Question One.

The results of the statistical analyses indicated that in the reported study there were statistically significant differences between treatment conditions. The treatment effect was $F = 18.94$, $p < .001$. The order of differences indicated that Semantic Feature Analysis was significantly higher than Semantic Mapping and that Semantic Mapping was significantly higher than Context as determined through analysis of the Comprehensive test data.

The two instructional strategies which are based on categorizing concepts as influenced by students' prior knowledge bases do positively affect word acquisition. It would appear that the inclusion of Semantic Feature Analysis and Semantic Mapping in teachers' repertoires for vocabulary acquisition teaching techniques would be advantageous. Both Semantic Feature Analysis and Semantic Mapping were shown to be more effective teaching strategies than Context was in the reported study.

Research Question Two

The results of the statistical analyses of the weekly dependent measure data indicated that the Context condition groups performed at a significantly higher level on the Context subtests than did the other treatment groups on their respective subtests. The analyses did not indicate that the Semantic Mapping subtest or the Semantic Feature Analysis subtest resulted in significantly higher performances

by their two respective treatment groups. It is impossible to state, therefore, that a test format that reflects a teaching strategy does positively affect test performance.

In conclusion, both Semantic Feature Analysis and Semantic Mapping were shown to be effective teaching strategies for vocabulary acquisition. In the reported study, Context did not fare as well as the other two as a specific vocabulary teaching strategy. The importance of contextual analysis as a student strategy for determining word meanings while reading should not be minimized. The present study did not deal with student strategies employed during reading but, rather with teaching strategies for direct vocabulary instruction. When teachers choose to teach vocabulary, Semantic Feature Analysis and Semantic Mapping are effective teaching strategies.

Recommendations for Future Research

Further research in the area of instructional method effectiveness for vocabulary acquisition and development would be most profitable, including several modifications of the reported study.

One modification of this study using different criteria in the choice of sample populations would provide for several differentiated sets of data. One criterion for choice of a sample population could be employed where differing prior knowledge bases would be expected among subjects. This could be accomplished by selecting subjects from varying social, cultural, or language communities.

A study of this type might show quite dramatically the degree to which different prior knowledge bases affect direct vocabulary instruction. Several recent studies have begun to look at this subject population criterion.

An adaptation of the study presented herein has been conducted as a collaborative study with the Taiwan Provincial Institute for Elementary School Teachers (Johnson, Pittelman, Toms-Bronowski, Chang, Tsui, Yin Chien, & Chin, in preparation). The subjects were 48 classes of fourth, fifth, and sixth-grade students from two public schools in Taiwan. The students were randomly assigned to three treatment groups (i.e., Semantic Mapping, Semantic Feature Analysis, and General Method) or the control group. Forty-five different target vocabulary words in Chinese representing the same nine conceptual categories as used in the study presented in this paper were used. Nine lesson plans for each treatment group using the Chinese target vocabulary words were developed. The instructional sequences for semantic mapping and semantic feature analysis were exactly the same as in this reported study. Three assessment formats, each reflecting the three treatments were developed. A comprehensive test where students were to match the correct meaning to the target vocabulary word was developed to be given as a pre and post-test. Results of the collaborative study indicated that all three methods caused highly significant vocabulary growth between pre and post-testing and the Chinese General Method was significantly higher than either of the prior knowledge strate-

gies. One possible explanation for this latter result was attributed to the nature of the Chinese written language.

A second study, "An Investigation of the Relationships Between Prior Knowledge and Vocabulary Development with Culturally Diverse Students," has been conducted to evaluate procedures for identifying and analyzing differences in vocabulary processes as they relate to cultural background (Karbon, in preparation). Research efforts for this study began in summer 1981 with an analysis of student responses to the nine semantic maps that were taught as part of the study reported here. In fall, 1981, specialists in semantics, linguistics, and anthropology familiar with Native American (especially Menominee) and inner-city Black cultures met with project staff to review and discuss the development of probe strategies, the semantic maps, and response analysis as well as aspects of cultural background.

The four semantic mapping topics, including the twenty vocabulary words which were to form the basis of instruction in this study were identified. (As in the study reported in this report, a large pool of potential target words was pilot-tested on a population identical to the target population for the study.) The study was conducted in November and December, 1981 in three sixth-grade classrooms--one comprised of Native American children from the Menominee Indian reservation, one comprised of inner-city Black children from Milwaukee, and one comprised of suburban Caucasian children from a small Wisconsin community. A semantic mapping

vocabulary lesson was taught to each population each day during the first four days of a school week. Each instructional period was followed by individual interviews with four subjects from the sample in which a set of probes was used to attempt to determine the source of elicited words and how subjects bridged these words to target words. A vocabulary test, as well as the Gates-MacGinitie Vocabulary Subtest, was administered to the entire class on the fifth day. It is anticipated that a report documenting this study will be completed by Fall 1982.

Several other criteria for choice in the sample population to be used in a modified replication of this study could provide for different types of information concerning the utility of the teaching strategies for general vocabulary acquisition. The grade levels used in this study could be altered to encompass primary or secondary student populations. Either student populations would provide for a differentiated developmental component that could shed light on the age level utility of the vocabulary teaching strategies. Another criterion for sample population choice could be varied ability levels represented within any chosen student sample. The identification of and resultant control for ability levels of subjects might provide invaluable information regarding the utility of the teaching strategies when considering specific learner characteristics.

Several other modifications of this study that would deal dir-

ectly with the choice of target words to be taught might prove useful. One extension of the study would be to have choice of target words determined by word class. A second criterion that might prove insightful regarding choice of target words would be to determine and, therefore, control for, the level of difficulty of the categories in which the target words are to be presented if Semantic Mapping or Semantic Feature Analysis were to be used as treatment conditions. It would be difficult to ascertain the level of difficulty of any particular category or topic, though it would be advantageous to attempt to deal with this criterion. Future research that attempted to control for category level of difficulty might find some very interesting empirical evidence to either support or reject the descriptive trend indicated in the present study that Semantic Feature Analysis compensates in some fashion the conceptual level of difficulty for the categorical arrangement of target words.

The research suggested or summarized to this point deals with general vocabulary acquisition and development. Text-specific vocabulary acquisition is also of prime interest to educators and reading comprehension researchers. Much of the vocabulary students are expected to acquire in school is particular to a specific piece of literature or content area text. In the latter case, the vocabulary is often highly technical and context related. Vocabulary teaching strategies that are amenable for general vocabulary development may or may not be adaptable to text-specific vocabulary acquisition

situations. Research in text-specific or content related vocabulary acquisition and development should investigate strategies which pre-teach the specific vocabulary that are incorporated in the prose passages that are also to be taught in the learning situation. This type of vocabulary research would necessitate dependent measures for not only vocabulary recall or recognition, but also for passage comprehension to determine the utility of specific vocabulary teaching strategies.

Additional research is needed in the area of teaching strategies that facilitate both general and text-specific vocabulary acquisition and development. The research recommended in this section would further delineate the specific utility of particular vocabulary teaching methods. The present study has demonstrated, however, that the two vocabulary teaching strategies that capitalize on students' prior knowledge through the categorical arrangement of word concepts (Semantic Mapping and Semantic Feature Analysis), do substantially and positively affect general vocabulary acquisition.

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